

# THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED  
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER AND ELECTRO-PLATERS REVIEW  
A TRADE JOURNAL RELATING TO THE NON-FERROUS METALS AND ALLOYS.

OLD SERIES  
VOL. 14, No. 2.

NEW YORK, FEBRUARY, 1908.

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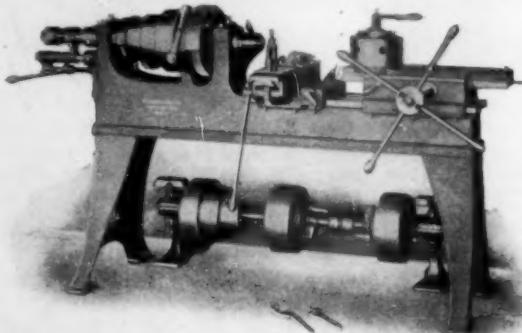
## THE TURRET LATHE AND ITS EQUIPMENT.

BY EASY WAY.

The evolution of the turret lathe has resulted from the effort of many men and the experiments of numerous companies. The writer will endeavor to describe a few of the best types for the most modern and economic results in the brass shops of the day—namely, the turret screw machine, forming turret lathe, the hollow hexagon or flat head turret lathe, and the universal turret lathe.

These machines are used extensively in the manufacture of brass goods, and a great variety of other articles where several operations are required to finish the piece. The work to be finished is usually held in an automatic spring chuck, automatic two-jaw chuck, box chuck, or a revolving jaw chuck, the special tools being arranged and secured in their proper order so that each in turn is presented to the article for its operation.

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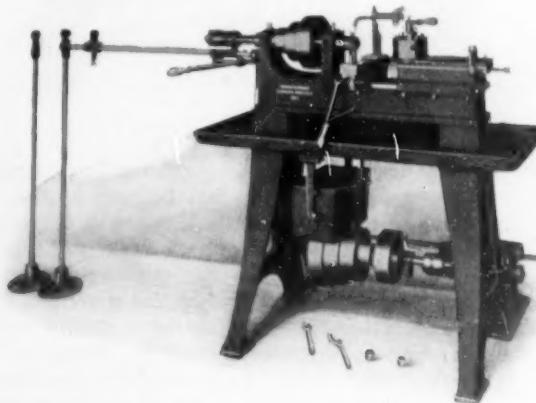


FORMING TURRET LATHE.

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In connection with machines of this design, using oil as a cutting lubricant, the oil separator is a marvellous expense saver. These little rotary machines are especially designed to separate the oil from the chips, turnings, or cuttings of any kind, and also from small work of all kinds made on the screw machine or other machine where

oil is a factor in the operation. The large amount of oil annually wasted is a strong argument in favor of their use. Oil can be separated and used again almost indefinitely, there being, of course, some waste, but it is small in comparison to the waste where no separator is used. There also can be considerable oil saved by putting small pieces of work in the machine, thereby not only removing the oil, but leaving the work in better condition than it otherwise would be. A machine which has a capacity of about 3,000 cubic inches is advisable, although at first thought this seems quite large. It is better adapted to bulky, light weight chips or turnings and is equally effective on ordinary work. The average time of a separator in cleaning its contents is from 5 to 8 minutes,



TURRET SCREW MACHINE.

the time being regulated by the condition and quality of the oil used.

### FORMING TURRET LATHE.

The forming turret lathe embodies a departure from the old system of turning irregular shapes. Their operation is extremely simple and the quality and quantity of work turned out is such that they are rapidly taking the place of all other methods. They are practically the same as the turret screw machine, only they are placed on legs instead of in a pan. These machines, equipped with automatic spring chucks, friction head and independent adjustable stops, enable the operator to complete the majority of articles suitable for the machine at one chucking. The article to be machined, having a carrier attached, the automatic spring chuck is indispensable. The chuck closer, actuated by a stepped wedge on the spindle, automatically adjusts the chuck to pieces of slightly varying diameter. Extra capacity chucks are used for work larger than the regular chuck carried with the same conditions. The friction head permits the operator to use two speeds without stopping the machine to throw in the



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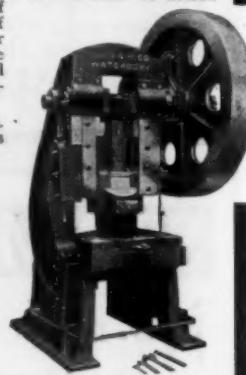
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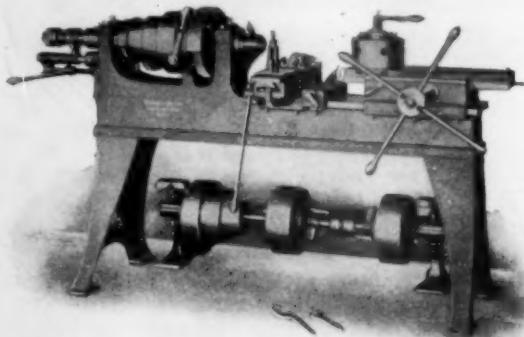
BY EASY WAY.

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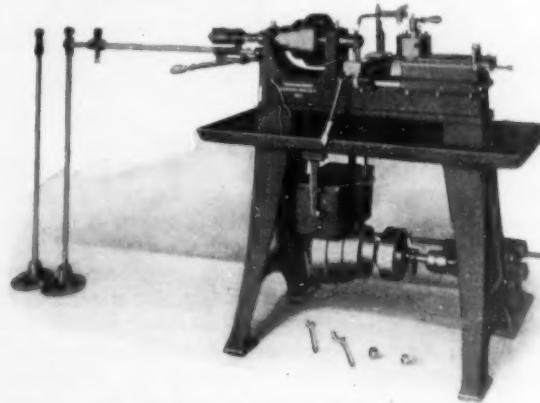
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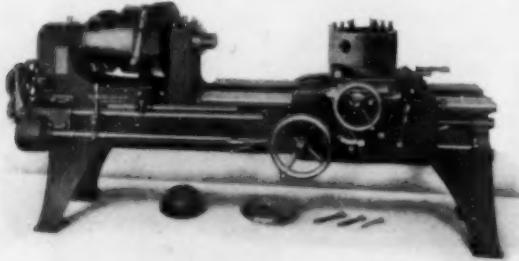
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back gears, thus changing from boring to tapping and turning different diameters. The independent adjustable stop allows the tools to be secured close to the turret, which prevents all unnecessary overhang.

In operation, the work requiring the tools in the turret is first done; then the forming tool is drawn under the part to be formed, thus completing the piece. The undercut forming attachment is the most characteristic feature of this machine. By means of a lever the tool is fed forward, and passing under the piece turns it to the proper shape and diameter. It is provided with all necessary adjustments, including a side motion for slight variations in the castings. For very large diameters a vertical forming attachment should be used.

#### CHUCKING LATHE.

The chucking lathe—one of the handiest machines in the brass shop—should be always equipped with the geared friction head and independent adjustable stops. When chucked work is spoken of the writer does not mean simply boring a rough hole to be reamed elsewhere, in a piece of work that is to be threaded or pushed on an arbor and then turned in some other machine. He does mean to finish the article and take every possible cut that can be taken, and still leave means for holding the piece.



FLAT OR HOLLOW HEXAGON TURRET LATHE.

The friction head allows the operator to accomplish this feat by moving the handle at the side of the cone to the right or left to throw the back gears in or out, and thereby obtaining the necessary speeds for changing from boring to tapping, and for turning different diameters of the same piece without stopping the machine. The independent adjustable stops enable the operator to have all the tools close to the turret, thereby saving all unnecessary weight and undue wear on the turret and its slide. The cut-off; or cross slide as it is generally called, should be provided with a lever for speedy production. (The handling of the work after leaving the chucking lathe will be taken up under the heading of "Equipment.")

#### HOLLOW HEXAGON OR FLAT HEAD TURRET LATHES.

The hollow hexagon or flat head turret lathes are especially adapted for producing heavier articles of manufacture such as duplicate body parts, etc., with a high degree of accuracy at a minimum cost. And yet this style of machine can be equipped with tools that are universal, and even when there are but a few pieces of one kind a marked saving can be made over old-time methods. When more intricate articles of different sizes, shapes and lengths are required, auxiliary turrets can be equipped with special tools and set up to do the piece; when the article has been finished this turret can be taken off the machine.

We are all presumed to know that it is very expensive to spoil any of the work done on these machines. A very important saving is effected by reason of the accurate uniformity of the work. Every brass shop manager knows the endless time spent in the setting of machines

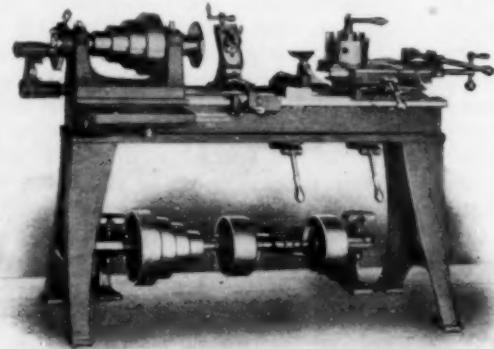
or in the assembling room, by trying to make parts fit together that have been poorly made. Accurate duplication cuts down the total cost of the finished product of a plant.

This whole combination results in a machine that is always in absolute readiness to make a piece of work any shape, quickly and accurately, and to turn out work in lots from 2,000 to 3,000 pieces of a kind with a turret lathe speed and accuracy of a well handled engine lathe.

#### UNIVERSAL TURRET LATHE.

The universal turret lathe is intended for the use of the more skillful workmen, such as in the making of models, jobbing and repair work, for which its construction is especially adapted. The head stock is, or ought to be, made to swivel on the top of the machine bed, and should be graduated in inches and degrees, so that all long, tapering holes can be bored by swiveling the head to the proper angle.

Brass workers will readily see the advantage of the method of boring tapering holes, as the power feed can



UNIVERSAL TURRET LATHE.

be applied, and the swiveling of the tailsrock is unnecessary. This machine head should be equipped with hardened and ground bearings, conical in shape so that accurate adjustment may be assured. The turret slide differs from the machines previously explained, as it has, instead of the turnstile, a lever and screw cross feed with graduated dial. The chasing attachment is arranged for cutting right and left hand, straight and taper, threads with the same leader and follower. The follower arm on the latest lathes of this type is so arranged that it does not withdraw from the leader while cutting taper threads. This machine, provided with a hand tool rest and a sphere or ball turning attachment, will turn out almost any article.

Now that we are equipped with a battery of turret lathes that will handle any job, we must turn our attention to the overhead work, for if that portion of the plant is not reliable we cannot get just results from the machines.

*(To be continued.)*

The American Consul-General at Rio de Janeiro states that American capital has obtained possession of practically all the diamond bearing territory in the Diamantina country. The success of the work means that millions of American dollars will be spent in Brazilian diamond mining. With the installation of dredging machinery at points along the Jequitinhonha River in the State of Minas Geraes, a revolution in the mining industry of the diamond district of Brazil is predicted.

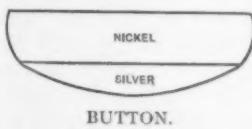
## RECENT RESEARCHES IN SILVER ALLOYS.

BY A. E. HOBSON.

It is my purpose to speak of silver alloys known as sterling silver, namely, 925 parts fine silver and 75 parts of other metal or metals, for any other proportion would be quite valueless from a commercial standpoint. An alloy of silver below 925 could not be hall marked or sold as sterling silver and above that the increased cost would make it prohibitive. Thus we confine our research to 925 parts of fine silver and 75 parts of other metals. Copper and silver, regular sterling, is too well known to need any remarks save that this alloy produces fire scale and at times may be steel or hard, if not properly melted.

Iron and silver will not alloy practically  
 Chromium and silver " " " "  
 Titanium and silver " " " "  
 Tungsten and silver " " " "  
 Vanadium and silver " " " "

Nickel and silver will alloy up to about one-half of one per cent., but on remelting the alloy separates and therefore is of no value. I have made a button of the alloy and the silver is found at the bottom thus:



The silver at the bottom contained 2½ per cent. of nickel and the nickel at the top 15 per cent. silver; but on remelting the metals separated again and we find the proportions different with each melt.

Cobalt and silver, same melts as nickel and silver.

Manganese and silver alloy. The alloy is white, softer than fine silver, lacks temper, full of ripples when rolled, is fireless.

Lead and silver; brittle and of no value, fireless.

Tin and silver; not so brittle as lead, no value, fireless.

Antimony and silver; yellow color stain similar to tin, fireless.

Bismuth and silver; soft but rotten, fireless.

Zinc and silver; soft, tough, but lacks temper, fireless.

Cadmium and silver; soft, but becomes porous in working, also lacks temper, fireless.

Magnesium and silver; very similar to cadmium.

Aluminum and silver; aluminum makes silver muddy, sticks to the crucible and is of little value; the alloy is fireless.

The best alloy is copper with ½ of 1 per cent. of manganese used as a deoxidizer. One-half of 1 per cent. of cadmium is often used to make the copper alloy softer.

Manganese and zinc alloys with silver have recently been patented in America and Europe as a fireless product.

It is estimated that up to the middle of the last century some 450,000,000 ounces of silver had been taken from the mines of Peru. During that time that country was one of the world's greatest sources of mineral wealth. The present developments of Peru are principally of the copper deposits, with silver as a by-product.

## SPONGY CASTINGS: THEIR CAUSES AND PREVENTION.

BY ERNEST A. LEWIS, BIRMINGHAM, ENGLAND.

Spongy castings are a source of considerable annoyance and loss to brass founders. Sometimes one is quite at a loss to account for them; it is generally put down to bad metal, and although this is often the case, it is not always.

The causes of bad sand castings are:

- (1) Bad metal.
- (2) Bad molding.
- (3) Bad casting.

They can only be avoided by great care and the best men are liable to make mistakes. Some metals and alloys are more liable to make spongy castings than others.

It is impossible to cast pure copper without getting spongy castings. The only way to get a good copper casting is to add 2 per cent. to 4 per cent. silicon-copper and melt it down under a thick layer of charcoal and not skim off the charcoal before pouring, but hold it back with a stick. Copper is the only metal; I advise the use of silicon as a deoxidizer. It is often stated that phosphorus added to brass or bronze castings will prevent sponginess; this is not altogether true, as phosphor bronze itself will give spongy castings.

Brasses and bronzes behave very differently in their facility to give spongy castings according to the mixture. Zinc is a powerful deoxidizer, and if a gunmetal or brass with zinc in it gives spongy castings, it may be taken for granted the fault is not due to the metal, but either to the molding or the casting. A composition gunmetal containing no zinc, say copper 85 per cent., tin 10 per cent., lead 5 per cent., if it has been run down from scrap, will absorb oxygen if it is not well covered with charcoal and render it difficult to get good castings. The best way to refine such metal is to melt it down under plenty of charcoal and stir well with a stick to reduce the oxides; then if it is desired, add 0.05 per cent. phosphorus. This will make the metal pour better, but it is open to question whether the phosphorus alone would reduce the oxides; personally I do not think it does. A very effectual way of reducing the oxides in such metal would be to add 1 per cent. zinc if it was not objectionable to the alloy. It must be borne in mind that a small quantity of phosphorus added to gunmetal hardens it considerably and for this reason should not be used to any extent as a deoxidizer. Aluminum is often recommended as a means of preventing spongy castings, but this is not the case. A small quantity of aluminum added to brass or gunmetal will make the resulting castings spongy and should on no account be added. This only applies to metal for sand brass castings; it does not apply to manganese bronzes.

The second cause of spongy castings is liable to occur with good metal even if made from pure ingot metals. It is caused by the gases generated on pouring the metal not being able to escape freely and remain in the metal. To prevent this kind of sponginess is entirely dependent upon the skill of the molder and the quality of the sand. It is better to have too large gates and runners than too small.

The third cause of bad castings is the most frequent cause of all. If the metal is cast too cold, that is, in a pasty condition, it is almost certain to give a spongy and "drawn" casting. These castings are easily detected. On the other hand, if the metal is cast very hot it may give a spongy casting; in this case the blowholes are very small and evenly distributed through the casting. Careful attention to the heat of casting the metal will prevent this last kind of sponginess.

If one casts phosphor bronze containing 0.052

phosphorus or thereabouts, when the metal is pasty, the resulting casting will be drawn just the same as if the metal did not contain phosphorus.

In connection with this subject a short note on the use of fluxes may be interesting. The best covering for all brass alloys is charcoal broken up finely; the use of salt,

borax and similar fluxes is not necessary. The only case in which I recommend the use of a flux is when running down skimmings or similar material. It will be found the resulting ingots will be very clean if some glass is melted down with it as a flux. For this work old crucibles are best, as new ones are quickly spoiled.

### CASTING PLASTER FOR PATTERNS.

By D. J. LEMAL.

In my previous articles I have been treating on wax patterns, and as they are cast in plaster molds I guess everybody who has read them does not understand



D. J. LEMAL.

the manipulation of the plaster of Paris. I will here endeavor to make a success with it, but before starting I wish to call attention to plaster work. A good plaster pattern maker can do everything that a wood pattern maker is able to do, from the smallest to the largest work, if well studied out; but it must not be inferred from this that it is always practicable to do the large plain work. For example, large string pieces are sometimes made in plaster, and when there are many

moldings it takes no longer for the plasterer to run a number of moldings than one; they will also be truer than wood. As some strings are 12, or 14 feet or over, in length, it is necessary to have the flask boarded over to receive the plaster work, and the lifting and transporting facilities of the foundry must be taken into consideration.

Small frail pieces can be strengthened with wire, iron rods, or pipes according to the requirements. What I call frail pieces are those in which the width and thickness are smaller than the length, such as spindles, square or round newel posts or columns that are not halved.

For plaster undercut work we may make waste molds and then glue molds off the pattern we get from the waste molds, thereby always keeping a pattern in perfect shape for casting by casting plaster in the glue mold.

I am sure some old molders will say such patterns will wear off too soon; that may be with some careless molders, but with careful ones who have their mind with them, they won't have any more trouble than with wooden ones. Again, the plaster need not always be in a crude natural state, as it should be well shellacked, using very thin shellac, like water, so as to penetrate well into the plaster.

In *THE METAL INDUSTRY* for October, 1906, I gave several ways for hardening plaster and if a still harder material is wanted Keene cement may be used. This is as hard as white marble, which it resembles a great deal, but it cannot be run like plaster, as it sets very slowly—about 24 hours being required—unless alum water is mixed with it; this will shorten the time to about 12 hours. It will be understood that it is always cast in plaster molds. It is dearer than plaster.

I think I have said enough about some good points of plaster for some thinkers. I wish to add that the leading and most progressive foundries of the country

are using it to such an extent that molders, not knowing of its use, would be surprised.

Above I stated undercut patterns could be made by the waste mold process, or gelatine (glue); such patterns always have drawbacks attached at the undercuts when going to the foundry.

Now we will begin by mixing, or as it is called by plasterers, gauging plaster. If a pail full of mixed plaster is wanted take a pail half or two-thirds full of water and sift into it through your fingers some good dry plaster, not some old resurrected stuff from the shelf. Keep sifting until it gets to the top and goes down slowly. Stop sifting when it gets so high the water on top of it will come up to the first joint of the index finger; that makes a good casting plaster. If more plaster is added it expands so much when setting that it is liable to burst a deep mold, and the first way makes the sharpest mold. Have your plaster mold (if casting from a mold) well shellacked, but see that not too much or too thick shellac is used to fill the fine lines. The shellac coating should be well dried. Before pouring in the plaster oil the mold with lard oil if it is a large one. If a small one use olive oil. Put the oil on liberally so as to touch all parts. Now wipe off the brush and with it take up all the free oil. Then pour in the plaster which has been well beaten with the hand from the bottom of the pail with an uplifting motion so as to drive up the air bubbles to the surface. The hand should be moved as rapidly as possible. As soon as the plaster has been poured in take a bristle brush about  $1\frac{1}{2}$  inches in diameter and agitate the mass by a quick churning motion; this will detach the small globules of air which are liable to fasten themselves to the bottom.

The plaster ought to be set hard in about 20 minutes or half an hour; a plasterer can tell by the heat generated or by scratching it. To take the cast off the mold fasten thin strips of wood to the exposed edges of the molds, turn it upside down and rap on the back over a piece of hard wood; or if the mold has wide edges rapping on the face of the edges will get the cast out by rebounds. When a number of casts are wanted from the same mold it is well to have 2 or 3 thicknesses of burlap in the plaster when making the mold. Of course the mold should have draught. In making the mold over any model the same course should be followed; but if the article will allow it a wall should be put up around it of wood or clay so as to hold the plaster.

"The jeweler of Revolutionary days was much more of a mechanician than the one of to-day. He was skilled as a workman in all kinds of metals—gold, silver, copper and every non-ferrocious metal known at the time."—*Jewelers' Dial*.

"Non-ferrocious" and non-ferrous seem to be one and the same to our contemporary and in passing we might note that this is about as accurate technical information as is found in most of the jewelry papers.

## THE TRAINING OF JEWELERS.

## A BIRMINGHAM UNIVERSITY SCHEME.

(From Our Own Correspondent.)

The vigorous efforts made on the initiative of Professor Ashley, the head of the Commercial Department of the Birmingham (England) University, to interest the jewelers of the city in university training, and its application to the jewelry trade, have met with a measure of success. It is nearly a year since the officials of the Birmingham Jewelers' and Silversmiths' Association approached the authorities of the university, with the object of securing a modification of the curriculum of the Faculty of Commerce, to meet the needs of the jewelry trade. Several conferences followed, the result of which is a scheme outlined in a pamphlet just issued over the signatures of Lionel Spiers and Stanley Johnstone, chairman and secretary respectively of the Jewelers' Association.

The circular sets forth the object as being "to facilitate university education for the sons of our members, and for others who may be intended to occupy positions of responsibility in the jewelers' and silversmiths' trades."

A programme of study is to include special technical subjects designed to be of definite advantage in after life, in the same way as the courses arranged for engineers. The university student may take at the Vittoria Street School courses of study, both theoretical and practical, carefully arranged to meet his special needs. It is pointed out that while any one may attend the lectures, those who wish to be admitted full members of the university and to work toward a degree must matriculate, and it is suggested that wherever university education is possible, a boy should qualify for matriculation before leaving school, by taking either the Birmingham matriculation examination, or some other of the alternative examinations allowed: "The examination is easy to pass whilst at school, but becomes difficult after an interval of a year or two."

The courses of instruction outlined are:

First Year.—At the University Buildings, Edmund street: (1) Elementary accounting, Professor Dawson; (2) elementary economics, Professor Kirkaldy; (3) the commerce of the British Empire, Professor Ashley; (4) a modern foreign language; (5) the commerce seminar, Professors Ashley and Kirkaldy. At the University Buildings, Bournebrook: (6) Metallurgy of the precious metals, Professor Turner. At the Vittoria Street School: (7) Drawing and modeling; (8) historic ornament in the metal crafts (Mr. Gaskin).

Second Year.—At the University Buildings, Edmund street: (1) Advanced accounting, Professor Dawson; (2) transport, Professor Kirkaldy; (3) the commerce of other nations, Professor Kirkaldy; (4) a modern foreign language; (5) the commerce seminar. At the Vittoria Street School: (6) Drawing and modeling; (7) historic ornament in the metal crafts, Mr. Gaskin; (8) processes.

Third Year.—At the University Buildings, Edmund street: (1) Cost accounts and the criticism of balance-sheets, Professor Dawson; (2) problems of business policy, Professor Ashley; (3) technique of trade, banking, and exchange, Professor Kirkaldy; (4) commercial law, Mr. Tilyard; (5) methods of statistics, Professor Ashley; (6) public finance, Professor Ashley; (7) a modern foreign language; (8) the commerce seminar. At the Vittoria Street School: (9) drawing and modeling; (10) processes.

It is no secret that the initiation of the movement was regarded with some scorn by the old-fashioned type of jeweler, but modern ideas have prevailed, and there is

every expectation that jewelers' sons will largely avail themselves of the opportunities now offered to establish a high artistic standard, and at the same time to give the students a working acquaintance with business economics and technique. There is a new departure even from the side of craftsmanship, inasmuch as the afternoon classes at the Vittoria Street School are to be supplemented by a new course on historic ornament in the metal craft. It is hoped that the effect of the commercial studies will be to endow the students with the qualities of mind necessary to the capable solution of the problems which modern industry presents in an increasingly pressing form.

From inquiries made by our Birmingham representative of leading jewelers, it is safe to predict the utilization of the scheme to a very considerable extent. But it is pointed out that at least a year will be necessary to test its working. It is tolerably certain, however, that in the university session which is about to commence a large number of jewelers, especially among the sons of manufacturers, will become students.

## BIRMINGHAM JEWELERS AND THIN SILVER.

(From Our British Correspondent.)

A largely attended meeting of the Birmingham Jewelers' and Silversmiths' Association has been held to consider the proposal of the Assay Office to fix the limit of thinness beyond which the Hall Mark will not be applied to silver. The suggestion limit, as already reported, is .0048 inch. In the course of the discussion it was pointed out that the effect of the limit would be to destroy the large trade built up during recent years in thin silver goods, and would enable foreign makers to displace this country in the cheap trade. The decided preponderance of feeling was in favor of the Assay Office regulation, much stress being laid on the contention that it is the British Hall Mark which sells silver goods, and that, in fact, this certificate of quality is the greatest asset of the trade; the cheap ware is destroying this tradition of excellence. Eventually a resolution was submitted approving the new regulation as a wise provision, and though many members of the association abstained from voting, the motion was carried by a large majority.

## OLD GOLD AND SILVER PLATE.

Particulars have recently been published of some of the precious gold and silver plate in the possession of certain aristocratic collectors. Pierpont Morgan owns a silver table ornament, consisting of an exquisite figure of Diana seated on a stag, with her attendant dogs, which, although only fifteen inches high, is worth £10,000. Another artistic gem representing a Nubian boy perched on a nautilus is hardly less valuable. Lord Newton, of Lyme, owns a silver rose water dish and ewer enamelled with his ancestral arms in the days of Queen Mary, worth at least £2,000. The Earl of Ancaster has a small regalia of plate bearing the crown and initials of James the First's consort, believed to be almost priceless, while the tall steeple-topped loving cups of that reign readily sell for £4,000 each. One of the most precious relics is that preserved at Welbeck, namely the chalice from which Charles the First took his last sacrament on the morning of the execution.

During the last calendar year the Straits Settlements exported to the United States tin to the value of \$13,539,844, being an increase of \$1,408,000 over the previous year.

## HAND WROUGHT COPPER.

By A. F. SAUNDERS, DESIGNER.

"Though we travel the world over to find the beautiful we must have it with us or we find it not."—Emerson.

I take delight in noting that within recent years the old art of copper smithing has been revived and has developed into a very important industry and craft. The beautiful soft warm color of the metal, its ductility, and cheapness, make it an ideal material for the art craftsman to carry out his simple yet effective productions; it harmonizes most beautifully with the modern scheme of interior decorations and furnishings, particularly in the missions and arts and crafts styles or rather movement, and is adapted to almost every object of utility and decoration where metal is used. My object in this article is to give an idea of how this hand-wrought work is done



ELECTRIC LIGHT STAND.

under modern shop conditions, yet based on aesthetic principles.

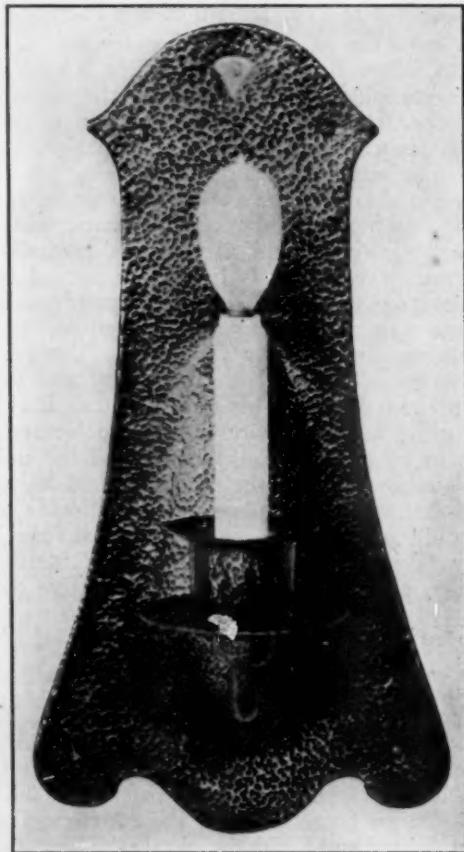
First comes the design, based on true proportion, utility and simplicity. The simpler the motive the more pleasing the effect, as the designs illustrated herewith prove. These pieces are hand wrought of soft sheet and bar copper. Sometimes brass is combined, making a pleasing contrast.

First the electric wall sconce; this measures 15 inches high by 7 wide, all of copper. The outline is very carefully cut out of sheet copper with a chisel, the raw edge being smoothed up with a file, then any raised work, as appears in this design, is worked up with a ball end hammer on a block of either hard rubber or soft lead, always working from the middle out to the edge, thus insuring an even distribution of metal. Any buckling or warping is finally forced out with different sized hammers, flattening and truing the whole piece so that it will set perfectly flat against the wall. The arm is hammered out of hollow tubing for the electric wires and the candle cup and drip plate are cut and hammered out of flat sheets bent into shape and

riveted, of course being made very exact in size to accommodate standard size electric sockets and globes.

The work is then ready for coloring. This is done by an old process of heating over a fire and then rubbing over with fine pumice stone or emery and oil, giving a mellow tone to the metal and brightening the high parts. This finish never loses its beauty; if anything age improves its effect.

The electric grille lamp is practically made the same way out of hollow tubing riveted onto the base and hav-



CANDLE HOLDER.

ing an iron pipe running up through the copper tube for the wires. The shade is chiseled out of sheet copper and filled in with opalescent glass of a mother of pearl hue, giving a delightful gleam of soft color to a room.

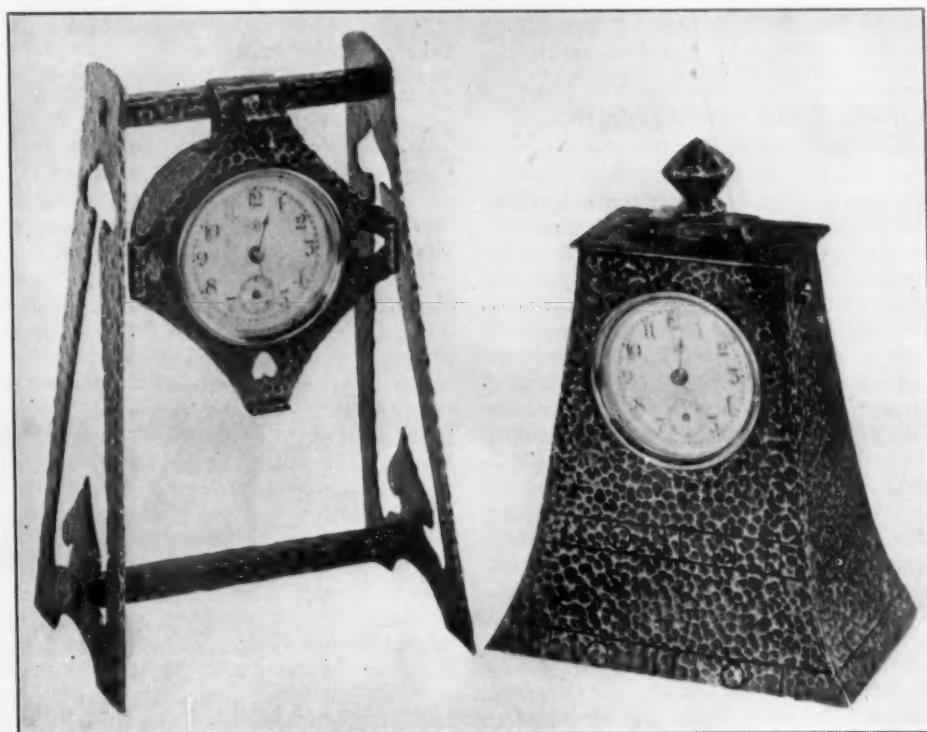
The two clocks are small desk clocks, and the smoking lamp has four small ash trays that nest together in the stand under the lamp when not in use.

This copper work is most interesting and deserves a high place among the art metal industries. It offers a broad field to the artist and craftsman and should receive every encouragement. As I before mentioned, the decoration of this work should be of a simple character; thus flat chasing and etching lends itself best. A very beautiful effect is obtained by copper plating the object made in brass (or vice versa), then etching through to the brass, leaving the design in copper and the background in brass, making a fine contrast.

While on this subject I wish to make mention of the so-called arts and crafts movement, its mission and influence upon modern metal work. It carries us back to the days of the handicraft guilds, when every craftsman was a master endeavoring to reach his ideal, pro-

ducing every part of the work himself; while modern methods restrict the craftsman of to-day. Conditions are

possess one treasure, one real work of art, however small, than a dozen gaudy, poorly made objects made for show



CLOCKS MOUNTED IN HAMMERED METAL.



COPPER AND BRASS—9 INCHES HIGH.

steadily improving and the buying public are beginning to recognize worth, and the fact that it is far better to

alone. It is by these little things that our taste is molded and cultivated to appreciate the true craftsman work.

In ending this article I quote three fundamental principles that guide the craftsman in his work and should be studied and remembered by all:

First—Utility should be considered before decoration; all decoration is objectionable that interferes with the

usefulness of the object to which it is applied.

Second—Simplicity in composition is more difficult of attainment than complication.

Third—Originality should never be adopted for the sake of novelty only.

#### ALUMINUM INDUSTRY IN GREAT BRITAIN.

(By Our Birmingham Correspondent.)

Great developments are about to take place in connection with the aluminum industry of Great Britain. The sole producers of the metal are the British Aluminum Co., Ltd., who are making preparations to meet a demand which is expected to be on a great scale. The company's plans were outlined in an interview by J. D. Bonner, the chairman of the company, who stated that by the autumn of 1909 the hydro-electric power plant now being constructed at the head of Loch Leven will be developing 30,000 to 35,000 horse power. That will enable the company to treble its present output in that department. In addition a factory has been started at Stangfjord, Norway, where 6,000 horse power will ultimately be at the firm's disposal. An additional branch of this business is also being developed at Osieres, Switzerland, giving an average of 18,500 horse power, which will be used purely for electro-chemical products. The company will thus be controlling no less than 60,000 horse power.

It is explained that since the reduction of the price of aluminum in October to £100 per ton the metal is being largely requisitioned in new fields of usefulness. There will be a large motor demand, but aluminum will be extensively utilized for electrical purposes such as transmission lines, switchboard parts, and all such cases in which conductivity is necessary, the aluminum in this respect largely superseding the use of copper, owing to its comparative cheapness. An important sign of the industry being developed by a subsidiary company at Greenock is the rolling of aluminum with copper or steel. A new department of usefulness will be in the manufacture of the new explosive "Ammonal," for which aluminum will be extensively required. The great feature of "Ammonal" is that it cannot be exploded by concussion, and a shell with a time fuse can therefore penetrate earthworks or armor plates before exploding.

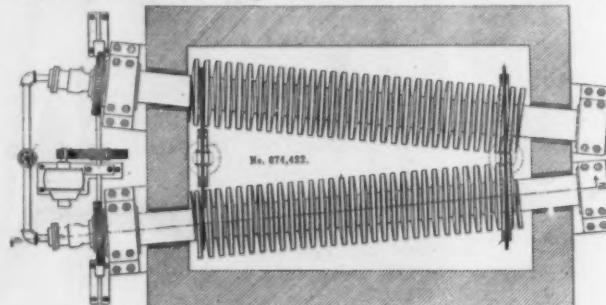
#### ALUMINUM IN SPAIN.

Consul-General Ridgely, of Barcelona, advises that the Official Gazette of Madrid has just published the conclusions of a report on the possibilities of manufacturing aluminum in Spain. It is stated that in some of the provinces of Valencia and Andalusia, and in other regions of Spain, there are deposits described as containing alumina. As to cryolite, when the only deposits in Greenland were monopolized by Americans Europeans had to pay dearly for it, but nowadays this mineral is economically manufactured from spatofluor. This mineral is to be found in Irún (Guipuzcoa), Spain, and quite abundantly among lead and copper ores. The author, believing that there exist in Spain all the necessary elements for producing aluminum and its industrial applications, expresses the hope that capital may be found for the purpose of establishing a factory in that country.

The United States general appraisers at New York have decided that small Japanese metal gong sets are not toys, but articles used for ornamentation and adornment, and are properly dutiable as manufactures of metal at the rate of 45 per cent. ad valorem.

#### CONTINUOUS HEATING FURNACE.

While the continuous heating furnace invented by Edwin Norton, of New York city, December 24, 1907, designed especially for the heating of packs of metal sheets preparatory to a rolling operation thereon, it is also applicable to the heating of single sheets, bars, rods, etc. The accompanying drawing is a sectional plan view. Extending through the furnace are two screws which converge toward the rear end. This



CONTINUOUS HEATING FURNACE.

convergence is such that the packs or sheets will stand edgewise between opposite pairs of threads without binding on the thread walls. This is for the reason that the corresponding threads of the two screws are in substantially parallel planes, at right angles to an imaginary line extending longitudinally of the furnace midway between the screws. The screws are driven by worm gears placed at the front of the furnace. Provision is made for cooling the screws by passing water through them. In the roof of the furnace near the ends are the openings for material, these openings being closed by swinging doors.

#### THE PLATING INDUSTRY OF MONTREAL.

By GEO. O. THOMPSON.

Plating in Montreal is carried on much the same as in the States, though not on such a large scale. The majority of firms that do plating here are manufacturers of plumbers' supplies, gas and electric fixtures, and builders' hardware. They all handle considerable job plating. The plating room staff generally consists of one or two men besides the man in charge. Owing to the great amount of building that is going on all over the city there is a steady demand for plated goods of every description. Besides filling local orders, much of the work done here goes to Ottawa, Toronto, Winnipeg and even as far as Vancouver. The principal finishes seem to be as follows in the order given: Old brass, satin finish, rich gilt, Japanese bronzes, Barbadian bronze, old copper, and oxidized copper, oxidized brass and black nickel. Occasionally there are special finishes of the matt bronzed and oxidized variety, in which the sand-blast plays a very important part. Now and then we get small quantities of goods to finish in Bower Barff. Large quantities of nickel plating are done. The Yale & Towne and other well-known firms have quite a few samples of their finishes on display here, which we are frequently called upon to match. A word about the working hours here may not be amiss. Most of the concerns run ten hours per day, year around, with the exception of Saturday, when they close at noon.

## VAPOR GALVANIZING.

BY ALFRED SANG.

(Concluded from page 13.)

You have seen the samples of vapor galvanized pipe<sup>3</sup>; their general appearance is that of bright electro-galvanized work.<sup>4</sup> In a strong light these samples show a slight iridescence on account of the extremely fine grain of the deposit. We find that the zinc vapor will deposit under rust, showing that the process is not an exact counterpart of the electric method where a free straight path is required between the zinc and the article.

The laboratory apparatus used for securing data on the process was as follows: A small Skidmore crucible, or retort, was connected by means of a long  $\frac{1}{4}$ -inch brass pipe with a coating chamber made up of a piece of  $1\frac{1}{2}$ -inch iron pipe, 6 inches long, and two caps; the crucible was heated from below to anywhere from  $400^{\circ}$  to  $900^{\circ}$  C., but the best results were obtained at or below  $600^{\circ}$ . Below  $400^{\circ}$  the distillation was too slow. In the crucible, zinc dust and finely divided carbon or some other reagent containing carbon, and other additions, were placed in suitable proportions; the best practice is to have a larger volume of the reagent than of dust and there is no loss from oxidation or from reduction in the mass. The air can be left in the retort and coating chamber; it probably plays a part in the process by furnishing oxygen for the formation of carbonic oxide, which reduces the oxide on the zinc dust particles, releasing the zinc vapor, which can then condense in a suitable atmosphere. If the temperature is allowed to run too high, reoxidation by the carbonic dioxide present is to be feared. You will notice that the new method bears the same relation to the older methods of coating by means of vapor which Sherardizing bears to the hot galvanizing process; Sherardizing is carried out in contact with zinc at a temperature below the melting point of the normal metal, vapor galvanizing is performed out of contact with zinc at a temperature below the boiling point of the normal metal.

The coating chamber does not become very hot, most of the heat it receives comes by the conduction of the apparatus. The internal pressure being very small, a non-conducting connection and valve between the generator and coating chamber could be used. There does not seem to be any advantage in heating the articles to be coated.

The mechanical advantages of the process over Sherardizing appear to be as follows: The generating kettle is small and need not contain more dust than is necessary for a day's run, or even less; it can be brought to the proper heat very rapidly and held there by means of a thermostat if fired with gas. There is no excess of dust to heat up and then to cool down and no weighty drum to handle to and from a furnace. A cast-iron coating chamber, suitably lined, and resembling a vacuum drying oven, minus the special fittings, will hold anything up to a full day's production of a plant. The equipment being fixed is subject to less wear and tear. The articles as they come from being cleaned can be placed on suitable trucks, rolled into the chamber and be allowed to soak in zinc vapor

<sup>3</sup>The coating on this pipe is light, having been treated but a short time to show the nature and closeness of the deposit and not to meet the usual tests.

<sup>4</sup>Other samples shown were a vapor-galvanized bolt; several Sherardized screws, two of them polished; electro-galvanized bolts and castings by the Meeker Co., Chicago; electro-galvanized conduit by the Safety-Armorite Conduit Co., of Pittsburgh; a hot galvanized radiator section by the Pressed Radiator Co., of Pittsburgh.

for three hours or more, so that it will penetrate thoroughly.

More than one coating chamber can be used in connection with one kettle having several outlets and valves. As soon as the time of soaking is up, the chambers can be opened without loss of dust, as in Sherardizing, because the valve will keep the air out of the kettle. There is no limit whatever to the size of articles which can be treated and an entire bridge member would not be an impossible piece to tackle. One style of plant would do for every kind of work and one chamber would do for anything within its capacity. The racks, trays, hooks, etc., would be made of wood or of metal suitably protected by some material which would not take a coating of zinc.

The time required to get a satisfactory coating will vary according to the nature of the surface and the composition of the metal, and users would have to figure the surface of their "charge" against the capacity of their generator.<sup>5</sup> Mr. Miller and I have obtained much quicker results with other reagents than carbon, but various drawbacks were found, among others the pressure created by volatile reagents. A concomitant of the failure to obtain a satisfactory coating was in all cases the reduction of a by-product, zinc, more valuable than the original dust. I do not doubt but that before long a reagent will be found which will enable the distillation to proceed more rapidly, but it may be at the expense of the quality of the product. When cooling takes place very rapidly and the pressure of the zinc vapor is high, crystals of zinc are deposited, but they do not adhere well and, while they are curious and interesting, they represent a waste. On non-conducting surfaces, such as carbon, the zinc is condensed as a dew of bright beads. With some reagents, such as coal tar, an outer deposit of carbon is obtained which is very attractive and has the advantage of giving a good surface for the reception of a varnish or enamel—an ideal combination—but the results have so far been very irregular and this line of investigation has been abandoned for the present.

The zinc vapor when given off, say,  $500^{\circ}$  C., is below its normal critical temperature and it will readily condense and invariably select the coolest spots; if metals and non-metals are present it will condense on the metals and all the more readily the nearer the specific heat of the metal is to that of zinc vapor. Zinc vapor condenses more readily on copper, which has got practically the same specific heat in the solid state, than on iron. The reason for this selection is by no means clear to me and is more likely due to some other quality which bears a more or less constant ratio to the specific heat, such as the atomic weight or the intrinsic electrical potential.

The percentage of the diluting gas and its purity, must play important parts in the process, just as they do in the case of the regular reduction process, of which vapor galvanizing is a counterpart, zinc dust being used in place of oxide, and the temperature being much lower and applied from without.<sup>6</sup>

At the temperature of the new process neither zinc metal nor zinc oxide would give useful vapors. The efficiency of finely divided carbon at these low temper-

<sup>5</sup>The same problem exists as in electro-galvanizing; at first zinc is alloyed to iron, later zinc is deposited on zinc.

<sup>6</sup>Similarly, in the case of an electrolyte, the degree of dilution of the zinc salt is of prime importance.

atures is readily accounted for; very pure carbon will take hold of atmospheric oxygen below its point of incandescence, in fact, as low as 200° C.<sup>7</sup>

Articles galvanized by means of vapor do not reach even as high a temperature as in Sherardizing and they fill the popular demand for "bright stuff." There are no residues and no loss from dust blowing about while being handled. There is every reason to hope that vapor galvanizing will soon take its place in the metal industries as a powerful antidote for corrosion.

#### VARIOUS APPLICATIONS OF THE NEW PROCESS.

Both of the latest processes for coating metals, Sherardizing and vapor galvanizing, suggest themselves for a number of new and valuable applications which were out of the question with the older methods. To galvanize fly-screening by placing it in the roll in a coating chamber sounds almost too good to be true. Boiler tubes can be given a coating which will not only safeguard them on an oversea journey but will lengthen their existence, for it is well known that scale will not adhere to a galvanized surface; if hot galvanizing cannot be made to render this service it is for reasons which I have already stated; hot galvanizing when heated is an agent of destruction on account of the flux which decomposes to hydrochloric acid and eats away the iron.

A light coating of zinc by either process is a better foundation for nickel-plating than copper; zinc and nickel adhere very closely and when alloyed are difficult to separate, even a small proportion of nickel seems to increase the resistance of zinc to volatilization to a very great extent.<sup>8</sup>

If aluminum is Sherardized it will solder and it can also be electroplated quite readily, taking the usual polish; the silver plating of certain hard aluminum alloys which have first received a zinc vapor treatment may prove of interest for many articles. In this connection I would state that silver which has received a short treatment before polishing is said to resist the action of sulfuretted hydrogen.

An attractive development of Sherardizing has been the inlaying and ornamenting of metals. The designs are obtained by limiting the action of the zinc by means of a stopping-off varnish. The edges of the patterns are not sharply defined, because the vapor will work under the edge of the stopping-off composition. While the results are lacking in contrast the general effect is artistic and pleasing at close range.

#### CONCLUSION.

Time does not permit me to discuss the comparative efficiencies of different zinc coatings; these efficiencies depend entirely on the nature of corrosion and it would be worse than presumption on my part to either propound or theorize on the subject of corrosion, when I can refer you to Allerton S. Cushman's thorough treatment of the subject.<sup>9</sup>

A German authority<sup>10</sup> has given it as his opinion that the value of zinc as a protection is due to its tendency to form an alloy with the iron; this is not an explanation, but it points to one. If the iron of a zinc-iron alloy is less readily dissociated in the presence of oxygen and of acids or other agents which supply hydrogen, the efficiency of Sherardizing is explained. The reason for the resistance of iron thus alloyed would

seem to be due to the contact effect between the zinc and the iron whereby the potential of the iron is increased at the expense of the zinc. The zinc becomes more sensitive to corroding influences, whereas the iron which is, so to say, over-saturated, resists decomposition.

The proper place to search for further improvements in protective coatings for iron and steel is in the study of the true causes of corrosion. In order to discover the remedy we must study the disease.

#### METHOD OF CLEANSING METAL.

In an invention patented by Jean Hawthorne, of New York City, November 26, 1907, the object is to clean metals without undue rubbing. It consists in electro-chemically cleaning the surface of the article by converting the oxide or sulphide of the metal (which presents the tarnished appearance) into metal. The solution used for this purpose is one which will cut or dissolve grease so that the chemical action may take place uniformly over the surface. While the following description applies to gold and silver, other metals such as copper, brass, etc., may be cleansed by the selection of the proper electrolyte and electrode.

The anode is a receptacle or dish of tin or aluminum in which is placed a comparatively weak but hot solution of soda ash. The silver or gold to be cleansed is immersed in this electrolyte and no action will be apparent while suspended therein (save that action common to soda ash in solution for cleansing grease and dirt); but as soon as a part of the silver or gold touches or is electrically connected with the metal dish, a primary voltaic cell is produced with the current flowing through the solution from the tin anode to the silver or gold cathode. A transformation then takes place upon the surface of the silver depending upon the strength and temperature of the solution.

What takes place is explained in the following way: "Ionic tin carrying a + charge is set free in the solution. The solution then contains ions of Na, H and Sn, all +, and — CO<sub>3</sub> and OH. The H and OH are derived by the dissociation of water. The Ag (silver) having a very much less electrolytic solution tension than the Sn tends to collect all the + ions in the solution, but the tin ions are not deposited on the silver, because they replace (in the solution), those ions lost by the solution. Of these the H gives up its charge and escapes as molecular hydrogen. The + charge flows back to the tin outside of the solution and this electrolytic action continues. Now if the silver has upon its surface any tarnish consisting of a sulphide or oxide of silver, the nascent hydrogen reduces it to metallic silver, apparently without removing any of the silver."

None of the silver is dissolved or lost, and there is no plating effect produced upon the article, and though the anode may lose some of its metal it loses it merely to the solution. The inventor believes that an outside source of electricity would be impracticable, since with an outside current there would be a tendency to plate instead of clean the article.

The electroplating shop needs the chemist and metallurgist more, perhaps, than any other branch of the non-ferrous metal industry. An examination of the inquiry columns of the trade papers demonstrates that rule of thumb methods in the plating room do not meet the requirements.

<sup>7</sup>Abbe Senderens, *Comptes-Rendus*, Feb. 18, 1907.

<sup>8</sup>A. R. Haslam, *Chem. News*, Vol. 51.

<sup>9</sup>Dept. of Agr. Bulletin No. 30 (1907), "The Corrosion of Iron."

<sup>10</sup>J. Spennath.

**THE PRODUCTION OF ETCHED GLASS OR HOAR FROST  
GLASS BY MEANS OF GLUE.**

By CHARLES H. PROCTOR.

Judging from recent inquiries there seems to be some interest in etching or the production of the feathery forms traced by frost upon window glass; as the method is applicable to the decoration of glass for various purposes, I give the process in detail, feeling at the same time that I have accomplished nothing new, but have only presented a little information. If a piece of ordinary or flint glass is coated evenly with glue dissolved in hot water, allowed to set and then placed upon a heater, the layer of glue upon contracting when drying will become detached from the glass and remove multitudes of scales of varying thicknesses. The glass thus detached presents a sort of regular and decorated design similar to the flowers of frost deposited upon window panes.

When salts that readily crystallize and which exert no chemical action upon the glue are dissolved in the latter the figures etched upon the glass exhibit a crystalline appearance that resembles fern fronds. One of the best effects is obtained by adding to the glue 6 per cent. of its weight of alum. When the glue has been completely dissolved and is of the consistency of a good heavy syrup, apply a layer to the glass by means of a brush, or the glass may be slightly warmed and the glue flowed upon it. After half an hour apply a second coat, which should be smooth and free from air bubbles. After the glue has hardened so that it no longer yields to the pressure of the finger put the glass in a warm place where the temperature can be maintained at about 120 degrees. When the glue becomes thoroughly dry it will detach itself in flakes and with it will come small flakes of glass. When this has been accomplished, carefully wash in hot water and dry. The designs thus obtained are not always the same, the thickness of the coat of glue, the time of drying and other conditions having a varying influence upon the number and form of flakes removed.

Other salts may be used in the same manner, such as hyposulphite of soda, chlorate and nitrate of potash, but alum, in the writer's opinion, gives the most satisfactory results.

**ANNEALING BRASS IN ROLLING.**

By A. W. L.

It is a rather difficult task to reply to the question "How many times can you roll brass without annealing?" I will, however, give an example of good modern practice. A bar of metal cast 6 inches wide and  $1\frac{1}{4}$  inches thick, in regular work would be handled as follows:

$1\frac{1}{8}$ " thickness to  $\frac{5}{8}$ " thickness in 2 passes, then anneal.  
 $\frac{5}{8}$ " thickness to No. 1 B & S gauge in 2 passes, then anneal.

No. 1 B & S gauge to 5 B & S gauge in 1 pass, then anneal.

No. 5 B & S gauge to 9 B & S gauge in 1 pass, then anneal.

No. 9 B & S gauge to 15 B & S gauge in 1 pass, then anneal.

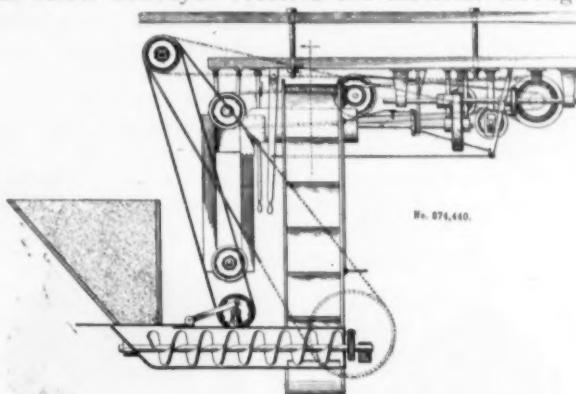
No. 15 B & S gauge to 21 B & S gauge in 1 pass, then anneal.

No. 21 B & S gauge to 27 B & S gauge in 2 passes, then anneal.

These passes are arranged to suit the temper and condition of the metal. While not exactly answering the question they give a good idea of what can be done.

**MOLDING APPARATUS.**

Letters patent were issued December 24, 1907, to Albert C. Rogerson, and by him assigned to the Automatic Molding Machine Company, of Chicago, Ill., for an improved apparatus for use in preparing molds, cores and forms for casting. The apparatus comprises a hopper for the molding sand, from which a horizontal screw conveyor receives the material through an



MOLDING APPARATUS.

interposed reciprocating screen or sifter. From this conveyor the sand passes to an endless inclined elevator which raises it to a second screw conveyor. This delivers the sand to a packer which discharges it into the flask with great force. The apparatus as illustrated includes means for receiving the sand from the molds after use, sifting it, elevating it and injecting it at high velocity and with great force of impact into the mold box.

A consular report attributes the success of the Welsh manufacturer to being able to keep his factory in complete operation and at the same time combat the present inflated prices of goods necessary for his business, too; First, carefully economizing in every branch the cost of production; second, particular attention to all suggested improvements; and third, vigilant attention to the demands and requirements of the new markets in China, Japan, India and Australia.

The United States Court of Appeals has just upheld the decision of the appraiser who classified nickel anodes as "manufactures of nickel." Hermann Boker & Company, the importers, contended that they should be classified under paragraph 185 as "nickel \*\*\* in \*\*\* sheets." This merchandise was invoiced as rolled anodes and consisted of plates of pure nickel about 12 inches long, 6.5 inches wide and  $7\frac{1}{16}$  of an inch thick. These were cut from nickel sheets and had holes drilled in them to permit them to be suspended in an electroplating bath. They were held to be manufactures of nickel not specially provided for.

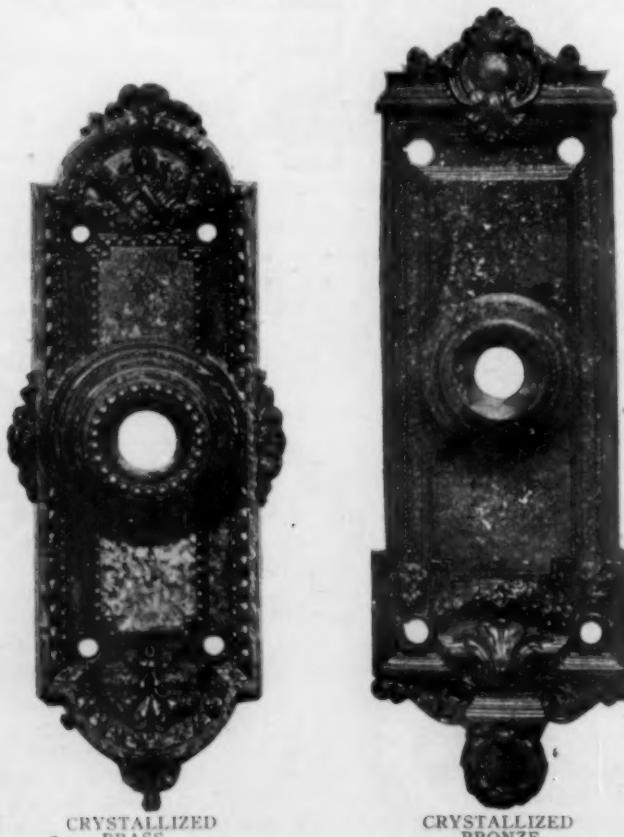
Remarkable activity is being experienced in the Birmingham lamp trade, owing to the new Act which compels all drivers of vehicles at night to exhibit a light. Birmingham is the centre of the lamp trade, and most of the lamps are made of copper, tin, or some form of bright alloyed metal. Many thousands of bicycle lamps are turned out by leading firms. Some towns have themselves initiated the compulsory use of the lamp, but others have entirely disregarded the position, and in Sheffield for instance where slow moving vehicles have not hitherto been required to carry a light, at least 10,000 vehicles will require them. The most popular form of lamp seems to be a galvanized article.

## A PRACTICAL SOLUTION FOR THE PRODUCTION OF CRYSTALLIZED BRASS FINISH.

BY CHAS. H. PROCTOR.

In no branch of the art of plating or chemical coloring of metals is there a greater number of finishes produced than in the cabinet hardware business. This is probably due to the large variety of woods employed, which are dressed in both natural and antique effects. In the production of metal goods of this finish the aim is to produce a color that will harmonize with the wood so as to obtain a pleasing result. Recently inquiries have been received for a practical method of producing a crystallized brass finish, as this finish produces a beautiful contrast upon any of the antique wood finishes.

Crystallized brass is not a new finish and the reason it is not more generally employed is probably due to the fact



that not many platers know how to get it. In going over a number of text books I find it referred to as a grained surface produced by pickling in a mixture of 1 volume of saturated solution of bichromate of potash in water and 2 volumes of concentrated hydrochloric acid. The articles should remain in the mixture several hours, according to the formula, and then bright dipped. Some time ago the writer saw the same formula given in a special article published in a contemporary of *THE METAL INDUSTRY*. From experiments made with this and other formulas the writer found that crystals could be produced but of such an indistinct nature that they could not be called a crystallized effect. Experimenting further a simple solution was produced that will give a beautiful effect in the finished article.

Cast brass gives the most beautiful crystallized effect, especially if a small amount of aluminum is used in the composition. Cast bronze gives an excellent effect, although the crystals are not as well developed as in the brass mixtures. Upon rolled or sheet brass very little effect is produced other than a sanded appearance.

The formula consists of

Sulphate of copper .....	16 ozs.
Commercial muriatic acid.....	1 gal.
Water .....	1 "

To make up the solution dissolve the sulphate of copper of boiling water and then add the acid and the solution is ready for immediate use.

Articles to be crystallized should have a large proportion of plain surface; this contrasts more distinctly with a variegated border or fancy repousse work. The articles are acid dipped, polished and buffed in the regular manner and then immersed in the solution which should be maintained at not less than 120 degrees. In a few seconds the crystals will start to develop and in 5 minutes they are usually sufficiently pronounced. Remove the articles from the bath and immerse in a 10 per cent. solution of potassium cyanide; this should be used quite warm. After a few seconds the articles are removed, washed and dried out in the usual way. This dip removes the darkened surface and restores the brass to its natural color. The article is then placed in the regular dip or other lacquer and dried well. The surface of the article will appear as if it had not been lacquered and no regular lacquer will produce a satisfactory result upon the plain surface for contrast. The next operation is to apply a thin coat of No. 1 copal extra turpentine varnish in the same manner as the lacquering. This can be accomplished very quickly with a lacquer brush as only the plain surface need be coated. The varnish is thinned with good quality of turpentine and a thin coat applied. The articles are again placed in the lacquer heater, and when sufficiently warm are removed and allowed to stand for a while when the surface will be found sufficiently hard. This gives the lustre that the lacquer fails to give and produces a finish that will stand much wear.

Other pleasing tones may be produced by immersing the crystallized brass articles, as soon as removed from the solution and washed, in a very dilute solution of sulphuret of potassium, not more than  $\frac{1}{2}$  pennyweight to the gallon of water. This gives a dark olive green tone that is very effective when finished as mentioned. In some varieties of cast brass it is advisable to use the solution more dilute, especially when the crystals develop slowly; but as a rule this is not necessary.

The Bangkok Times states that a gold coinage law is being drafted for Siam. The law proposes to reintroduce the "stang," but made of copper and not of nickel as before.

Japan leads in the annual amount of copper in bars, rods, ingots, slabs and ore sent into China, the United States being a close second. In the opinion of the American consul at Newchwang this trade could be greatly improved.

The business done by the United States with Chile in silverware is by no means extensive, although the American consul at Valparaiso states that there is a demand for all kinds and all grades, and that the demand is on the increase. According to government reports this country furnished no silverware in 1904, and but \$240 in 1905, out of a total importation of \$10,000, while in 1906 the United States contributed only \$52 worth out of \$8,524. Most of the silverware now comes from England and Germany.

## CORE MAKING MACHINES.

BY GEORGE H. WADSWORTH.

The following very interesting account of the development of core machines we take from an article read by George H. Wadsworth, superintendent of the Falls Rivet & Machine Company, at a recent meeting of the Chicago Foundry Foremen, held at the Lewis Institute, Chicago, December 18, 1907. The full title of the paper is "Foundry Cores, Core Sand and Core Making Machinery."

We now turn to the great class of cores known as machine made cores. The line of core machines exhibited here tonight are the result of experiments carried to a successful conclusion to overcome difficulties met in foundry practice which had come under the speaker's observation.

The first machine developed was one to produce cylindrical cores from 1" to 1½" in diameter. Dies were afterward fitted to this same machine, which enabled us to make cores to 2¼" in diameter and down to ¾". At first it was supposed that only cylindrical cores could be made, on account of the fact that it was observed that the core as it came from the die always rotated. Later, however, an attempt was made to turn out square cores, and as this proved successful many other irregular shapes of prismatic cross-section have been successfully turned out on the standard machine.

It was natural that some foundries would demand larger cores than the first machine could produce, and so a new one was designed known as the No. 2, which was capable of turning out cores up to 5" in diameter. This was successful, and the design was later changed so as to enable it to make cores up to 7" in diameter.

When the first machine was brought out it was intended to be operated by hand, but in response to the demand which came from certain customers, power attachments were supplied. When the larger machine was designed it was intended as a power machine only, but experiments showed that by using a large fly wheel it was possible to turn out any size core by hand, and later there came an inquiry for a machine capable of turning out slab cores, and to meet this demand the multiple spindle core machine was designed, and it has proved very successful indeed.

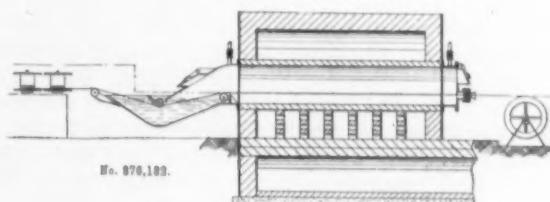
The next step was naturally to use the multiple spindles for turning out several cores in parallel, and a machine of this type is on exhibition. The next demand received was one that at first sight seemed a stammerer. It was for one which should turn out small square cores which should not vary more than 2/1000 of an inch above or below the required size; in other words, should be held within 4/1000 inch as the total limit of error.

To accomplish this the multiple spindle principle was used, special dies designed for the purpose and the cores turned out very satisfactory in all particulars. One point worthy of note is that these core machines could never have been designed and made successful without keeping in very close touch with the work which they were doing. Occasional visits to the factories where they were installed has given opportunity to study the weaknesses and to correct them, and this has resulted in the improvement of the machine and bringing it to its present state of excellence.

Pieces of hematite, or bloodstone, less than 1 inch in any dimension, designed and suitable for jewelry settings exclusively, are dutiable as precious stones at 10 per cent. ad valorem.

## ANNEALING FURNACE.

According to the usual practice, coils of wire are passed slowly through a muffler or other annealing furnace, and after being suitably heated therein in a non-oxidizing atmosphere, are thrown into water or carried through water by mechanical means. The coils are heavy and consequently difficult to handle, and they require large and expensive muffles; and they can only be heated by exposure to the action of the muffle for a considerable length of time, this involving a large expenditure for fuel. There is, also, the danger of overheating the wire at the outer portion of the coil in the endeavor to raise the temperature of the wire at the inner portion of the coil to the required degree. Another drawback is that,



ANNEALING FURNACE.

after the wire has been annealed, it must be wound from the coils upon spools and must be cleaned and polished while passing from the coil to the spool.

It is claimed that all these objections are overcome by an invention for which letters patent were issued to James A. Herrick, of Philadelphia, Pa., January 7, 1908. According to this the wire is passed continuously through a heated muffle or annealing furnace containing a non-oxidizing atmosphere. The wire is then passed through a suitable fluid bath to complete the annealing and cleaning operations, and thence to a spool suitably placed and power driven. Provision is thus made for locating any mechanism for polishing, drawing, or the like between the bath and the spool upon which the wire is finally wound, so that the whole operation can be performed at once instead of in several separate and distinct steps.

Among the Levantines, writes the American Consul at Smyrna, jewelry is much used as an investment. Even now, and in spite of the many savings banks which provide a safe and remunerative investment, people in the interior prefer to purchase jewelry, probably through a feeling of suspicion in turning their money into strange hands. Smyrna abounds in jewelers and goldsmiths, who are not, however, skillful in cutting and setting. Precious stones, especially diamonds, are imported in the rough state from Holland. It is difficult to value the amount imported, as the greater part of this article is smuggled in.

The Treasury Department has decided that unfinished bronzes come under paragraph 193 of the tariff act of 1897 relating to articles composed wholly or in part of metal and whether partly or wholly manufactured. The general appraiser states: "The samples introduced in evidence in this case consist of the various parts of a figure, apparently as they were taken from the mold. Each part had to be cast in a separate mold, and they are evidently intended to be finished by hand. \* \* \* They are clearly, in our judgment, articles or wares of metal partly manufactured. To say that they are not partly manufactured would be to entirely disregard the elaborate work necessary to produce an article such as we have before us. We can not so hold."

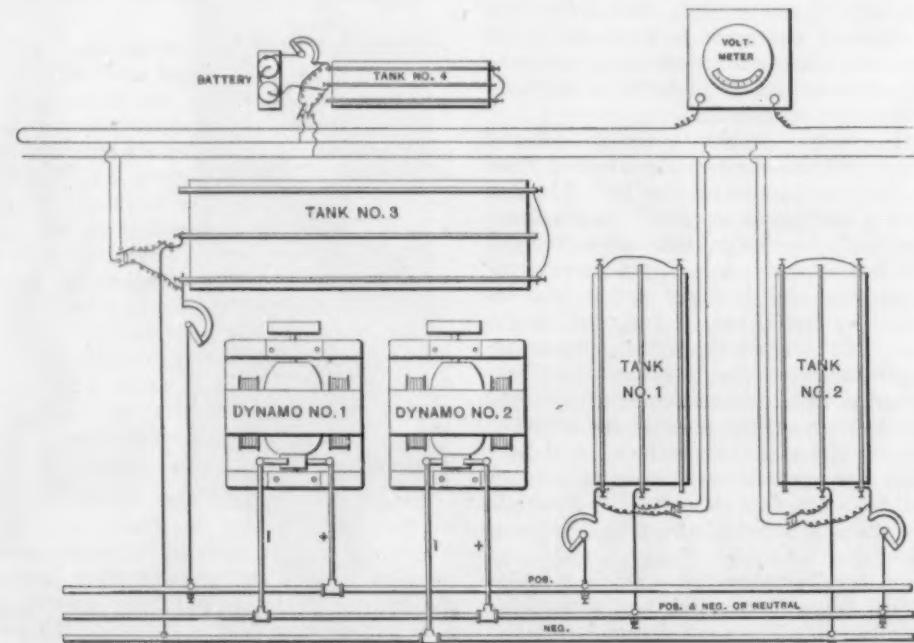
## ELECTRICAL EQUIPMENT OF PLATING PLANTS.

By W. L. CHURCHILL.

Few plating plants are electrically equipped in a manner to utilize the current at command, to the best advantage, or to generate the current needed in the most efficient and economical manner. There are several reasons for this, chief of which are probably lack of technical electrical knowledge by the plater in charge, and lack of knowledge of plating requirements by the electricians, usually called in to supply this deficiency. As a result of this combination, we frequently see plants nicely equipped from the practical electricians' point of view, yet giving the plater inadequate or inefficient service, or else (and frequently in addition thereto) requiring a much greater investment in the original equipment than necessary. Few platers are electricians, and beyond a knowledge of the fundamental principles of current generation and distribution and a working knowledge of the care and maintenance of such equipment as he has in charge, it is not essential that he should be, although granted that the

possible output, would be a serious objection to this practice. This, however, is of less importance than the lack of flexibility, to take care of demands for abnormal voltages, and to keep any part of the plant in operation, in case of necessary repairs to generator. Some plants do consider this latter phase of the matter, and install several dynamos, connecting each to a separate group of tanks, making temporary connections to other groups in case of necessity; this arrangement prevents the likelihood of the plant being shut down for repairs, but otherwise is open to same objections.

In the matter of measuring instruments, a great diversity exists from plants that use nothing but a file struck across the two bus-bars of a tank, and judging by the size of the spark that appears, to that of having an ammeter and a voltmeter mounted on each tank. Most establishments can afford and should use measuring instruments, as their intelligent observation is of decided advantage in many ways, yet not all plants



ELECTRICAL EQUIPMENT OF PLATING PLANTS.

more thoroughly he is grounded in this science, the more intelligently he can govern this function of his work. On the other hand, electricians frequently, when called upon to estimate and plan, for the electrical equipment of such a plant, are unable to obtain all the facts in connection with the requirements that they should; usually they find the number of gallons of solution in use or likely to be used, and by means of a table of amperes per gallon (furnished them by the plater from some platers' supply catalogue), figure out the number of amperes necessary, then throw in a few for good measure, and recommend a machine of that size, giving the voltage that the plater says he ought to have.

As a rule, few large plants have all of their solutions in use, all of the time, and were it not for the fact that their current generation is but a small portion of their expense, the needless running of a single large generator all of the time, and using only a portion of its

care to invest in a pair of instruments for every tank they have in use. To meet the demand for an instrument that will indicate for more than one tank without having to carry it to each, there are several voltmeters on the market, furnished mounted on a switchboard having contact buttons, connected to wires leading to the different tanks, thus enabling the plater to determine the voltage of the current passing through each tank so connected; this is an excellent plan, though open to the objection that the plater cannot regulate the current at his tank and read the voltage at same time, unless that particular tank is in connection with the instrument, and the instrument is visible from the point at which the rheostat is located.

As a sample of what can be done in this line, the following sketch of an actual installation that met all the objections above mentioned and at same time increased the utility of the electrical equipment already installed, is submitted.

Two dynamos were in use, either of which would normally run about two-thirds of the maximum capacity of the plant. Both were of about the same voltage (5) and as more than this voltage was not ordinarily required for their plating, it was first intended to connect in parallel, using either or both, as the occasion demanded, but the plater mentioned that the electrolytic-cleaning solution that he was using would work better on refractory work if he could obtain 8 or 10 volts, and desired to have a separate machine for this purpose; however, as this higher voltage was used but infrequently, it was decided to connect the two dynamos already installed, on the three-wire system, thus allowing up to 10 volts to be used at any tank at any time that both machines might be in operation.

By referring to the accompanying drawing, this plan will be more readily understood. The positive (+) pole of dynamo No. 1 is connected to the positive bus-bar; the negative (-) pole to the neutral bus-bar; the positive pole of No. 2 dynamo is connected to the neutral bus-bar and its negative pole to the negative bus-bar. It will be noticed that tank No. 1 is illustrated as in connection with dynamo No. 1, thus admitting the current of that machine only, while tank No. 2 is connected in a similar manner with dynamo No. 2, and tank No. 3 (which illustrates the cleaning tank requiring the higher voltage) gets its current through the two machines in series, thus obtaining their combined voltage. Tank No. 4 is introduced in the drawing merely to illustrate the possibility of measuring current generated from several sources, on a single stationary instrument as described further on.

The three bus-bars were run parallel and in as close proximity to all the tanks as practicable. Simple, quickly detachable, clamping-hooks were made and secured to the bus-bar end of each wire leading from bus-bars to tanks or rheostats, thus admitting of ready change in connections, from one dynamo to the other, or through both. (Switches for this purpose can be obtained or made, and if frequent changing is required, or if bus-bars cannot be run within convenient reach, would be much preferable, as they would be quicker to handle and eliminate possibility of wrong connections, although working no better, than the simple expedient resorted to in this case.)

By this arrangement, the normal output can be maintained by running either dynamo, connecting all tanks in use to its pair of bus-bars, while abnormal demands can be readily met by running both machines, and operating any tanks desired from either machine, or in series with both.

Referring to the volt-meter connections in the drawing, it will be observed that the leading wires are attached to the tank ends of current conductors, and that double pole switches are used in voltmeter circuit. It will also be observed that the wiring to the voltmeter is so arranged that current travels through the same length of wire, no matter what the distance may be from any tank to voltmeter.

The double pole switches are merely two push-buttons, one on each wire, and both mounted on or near rheostat of each tank. The voltmeter is mounted in a position to be seen from any tank.

In practice, as each tank is filled with work, the operator of that tank depresses the two push-buttons (or double pole switch) with one hand, moves the rheostat switch with the other, until voltmeter indicates the voltage desired; then releases the two push-buttons, thus leaving the voltmeter ready to indicate from any other point.

In this way a single instrument will answer for any

number of tanks without compelling the operators to travel from tank to voltmeter each time a reading is desired.

Ampere readings being less frequently required, except in some special lines of work that can afford ammeters for each tank, it is usually preferable to use a portable instrument rather than attempt an elaborate set of permanent connections for the purpose.

#### CLASSES FOR BRASS WORKERS IN BIRMINGHAM, ENG.

(From Our Special Correspondent.)

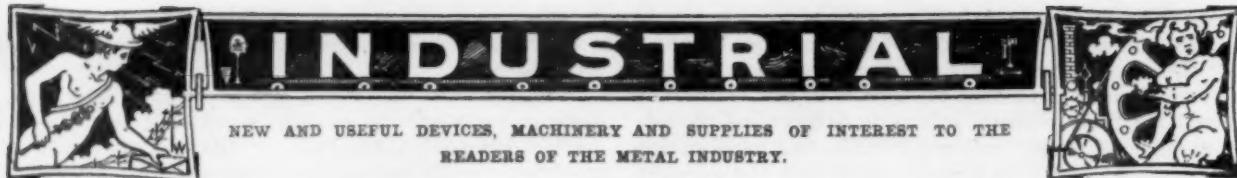
The special classes for brassworkers, commenced in connection with the Municipal Technical School, have met with marked appreciation by brass manufacturers who believe that in a few years the course of tuition will raise the whole calibre of skilled workmen. The greatest importance is attached to the second year's course, which deals with mensuration, the use of micrometers, pyrometers, and other scientific matters of practical value. For the bulk of the workmen this kind of teaching would take them a decided step forward.

There has been some complaining about the amount of fees imposed, and on this point Benton & Stone, of Bracebridge street, have made a practical suggestion. They point out that it is impossible or difficult for the younger brassworkers to pay down so large a fee as 12s. 6d., and they suggest that the employers should utilize the amount that they have guaranteed towards the classes to pay the fees of those wishing to join. As an alternative, they might advance the money to the men. This firm, who are among the most enterprising and up-to-date brass manufacturers in Birmingham, have adopted the first of their own alternatives, and out of the 107 entries already made for the classes, 51 are from their works. The only condition imposed is that the pupils shall attend the whole of the classes. In addition the firm offer a prize of 10s. to pupils who pass the examination in elementary study, and £1 for advanced pupils. It seems likely that the example will be followed, and the classes will then be thronged with pupils. While this has got over the difficulty caused by the fees, it has not removed the grievance, and there is great complaining that 12s. 6d. should be charged, when only 2s. 6d. is the fee for electro-plating, and 3s. 6d. for silver plating. The agitation against the fees will probably continue until substantial reductions are made. This is the only fault found with the classes, and in all directions the curriculum is commended as a common-sense course.

Practically all of the Turkish emery stone comes from mines in Asia Minor situated about 200 miles southeast of Smyrna. Mines a little nearer Smyrna produce emery best adapted for polishing purposes, while those further away yield the proper quality for wheel manufacturing.

Manufacturers using specially denatured alcohol are required to provide a room in which to store the alcohol as it is received. They must also name a custodian, who has supervision over the room and the alcohol stored in it. This room must be used exclusively for the storage of alcohol.

Press dispatches from London state that 32,000,000 coins made of aluminum have just been struck from the Royal Mint for circulation in Uganda and the Nigerian protectorates. Each coin is of the value of 1 cent and is perforated after the manner of Chinese coins, so they can be strung together. The advantages claimed for this metal is that it is light and is the best non-germ bearing metal known.



**A MODERN POLISHING ROOM.**

The Sterling Blower & Pipe Mfg. Co., Hartford, Conn., have recently installed a number of complete refuse removing exhaust systems in the plant of the Underwood Typewriter Co., Hartford, Conn.

In building their immense plant careful consideration was given to all matters pertaining to the welfare of their employees. All parts of the factory are perfectly ventilated by means of an exhaust system, while all the refuse is removed to a point designed for it by the same means.

The system for removing the dust from the polishing and buffing wheels is worthy of particular notice. It is a well known fact that the dust from polishing and buffing wheels is particularly injurious to the operator, and for this reason it is necessary that great care be taken or he is liable to contract consumption. This was formerly a man's work, but the Sterling Blower &

worked, the value of the metal dust saved in a short time equals the total cost of installing the system.

**MOTOR DRIVE IN A HARDWARE FACTORY.**

The popularity of the electric motor drive is due in no small part to the general satisfaction that has attended the use of squirrel cage induction motors. Simple and rugged in construction, reliable and efficient in operation, they are remarkably free from the operating difficulties that attend the use of the more sensitive commutator motor. Manufacturers, realizing these as well as the further advantages pertaining to the use of the electric motor drive as a whole, now specify electric motors for power purposes when contemplating the erection of a new plant or the enlargement of the old.

A notable example of the application of the induction motor drive to the solving of power problems in a mod-



A MODERN POLISHING ROOM.

Pipe Mfg. Co. have effected a change in these conditions. As shown in the illustration, by using the exhaust system, these conditions can be entirely obviated and so completely will it remove the dust that a girl can do the work in perfect safety without any harmful results.

The Sterling slow speed fan system exhausts the refuse directly from the wheels and the absence of this dust and lint about the polishing and buffing departments diminishes the fire risk to a large extent and enables the owner to obtain a lower insurance rate.

The reader will note the construction of the hoods which are so designed as to prevent any grease from entering the pipes and thereby clogging up same. It will also catch any piece of work which the operator may accidentally drop into the hood and so prevent same from being exhausted through the discharge with the refuse. This system also prevents the dust from getting into the bearings of the machinery.

These are but a few of the qualities claimed for the Sterling system. It not only does all this in a first class manner, but in many cases where it is attached to machinery where precious metals are

ern manufacturing establishment is found in the factory of the O. M. Edwards Company, of Syracuse, N. Y. This company is an extensive manufacturer of hardware specialties used in both the steam and electric railroad trade. Formerly the company purchased power from the Syracuse Lighting Co., using 500 volt direct current motors for driving the wood and metal working machinery. They were so well satisfied with electric motor drive that when their factory was enlarged an isolated alternating current plant was installed, together with a complete induction motor equipment.

The generating equipment consists of a Sweet Straight Line engine direct connected to a 220 volt, 70 kilowatt, 60 cycle, 3 phase generator. The generator is of the revolving field type built by the General Electric Company. A tap is brought out from the neutral point of the generator winding for incandescent lighting purposes.

The motors are of the standard General Electric squirrel cage type, the total capacity installed being a little over one hundred horsepower. The method of drive is what is commonly known as the group drive, the motors being suspended on platforms from the ceiling. In each machine-room the machines are assembled in four groups, a motor in each corner of room driving separate

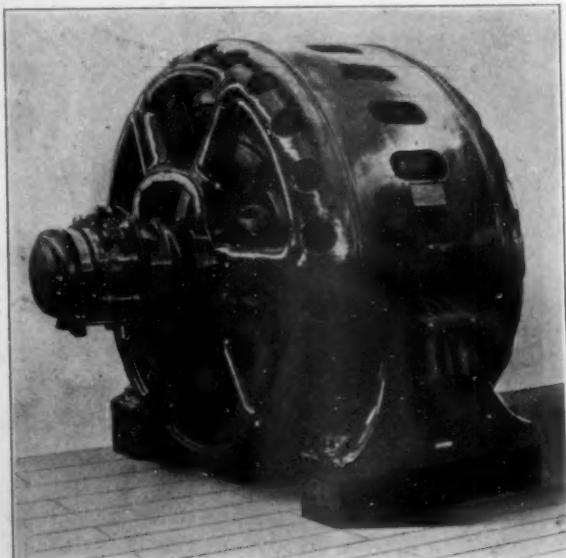
line shafting from which machines are belt driven. Starting compensators are placed conveniently near to the motors.

Special attention has been given to the arrangement of machines, with the result that a minimum of time is lost between the different stages in the manufacture of the product. The wiring is all conduit work and adds considerably to the finished appearance of the interior.

#### INDUCTION MOTORS FOR COPPER AND BRASS ROLLING MILLS.

The new plant of the Buffalo Copper & Brass Rolling Mills at Black Rock Station, will be driven by means of induction motors supplied with power transmitted from Niagara. For driving the rolls, three Allis-Chalmers motors will be used, one of 500 horsepower for the main rolls and two of 250 horsepower for the finishing rolls. All three motors are of the wound rotor type designed to operate at 25 cycles, 2300 volts; the 500 horsepower motor runs at 375 revolutions per minute, synchronous speed, and the 230 horsepower at 500. The motors are connected to the rolls by means of flexible couplings.

The illustration shows the 500 horsepower motor, and the two 250 horsepower are of exactly similar design; the construction throughout is very substantial and suited to the exacting requirements of rolling mill work. The stator coils are placed in open slots and held in place by wedges so that they can be readily removed. The stator core is provided with numerous ventilating ducts to allow circulation of air through the core and windings. The end connections of the stator coils are securely held where they project beyond the core. The stator yoke is of box frame construction, the laminations being held in place by dovetail projections on the punchings.



INDUCTION MOTOR.

The rotor is provided with a three-phase Y-connected winding connected to three cast copper collector rings mounted on the shaft. The rings are outside the bearing housing so as to be readily accessible, the leads from the winding being brought through a hole in the shaft.

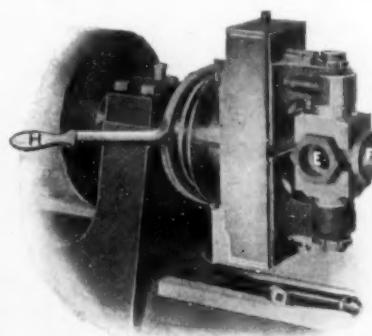
The rotor winding is made up of copper strip having the conductors in the slots connected at the ends by involute end connections securely held in place by brass shields. The whole rotor construction is such as to give thorough ventilation of all parts. The bearings are of the ring-oiling self-aligning type.

Each motor is provided with a cast grid secondary starting resistance with an oil immersed controlling switch for cutting the resistance out of circuit and gradually bringing the motor up to speed. A small part of this resistance is designed for continuous service, and can be left in circuit.

B. J. Dashiells is consulting engineer in charge of the new construction and equipment, which will be used chiefly in the manufacture of copper sheets.

#### THE ESS ESS SEMI-AUTOMATIC REVOLVING CHUCK.

These chucks, which are designed and built by the Scott & Sons Company, of Medford, Mass., are specially adapted for use on turret lathes for finishing pieces that have more than one end, such as valves, stop cocks, pipe fittings, etc. The operation is as follows:



INDUCTION MOTOR.

The piece to be finished is placed between the jaws, which are then closed in the usual way by means of a wrench and screw. The turret is then brought into play and the various tools applied to produce the required finish on the end of the piece which is then in line with the turret. This end being finished the next operation is to revolve the chuck so as to bring another end in line with the turret. This is performed by means of the handle H, a forward movement of which revolves the jaws 45 degrees, two movements being required to bring a piece with a 90 degree angle in line with the turret. These movements are made very rapidly and it is not necessary to stop the lathe to do it, as the chuck revolves equally as well while the lathe is running. The consequence is that a piece having two or more ends is finished in a fraction of the time which is consumed when the piece is chucked separately and the lathe stopped for each individual end as is common practice when ordinary chucks are used.

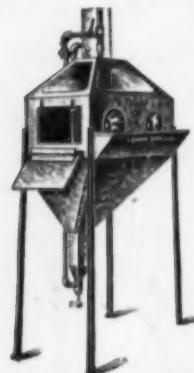
In addition to the saving in time the piece is finished more accurately by this method because all the ends are finished at one chucking, consequently the angles are more accurate. While these chucks were originally designed for brass finishers' use they have been used in many cases for manufacturing articles in iron and steel.

One of the most difficult articles to manufacture on a turret lathe is a gate valve having taper seats. Previous to the introduction of this chuck it required a good deal of setting up and a good many operations to finish the body. These are now finished at one chucking with this chuck and in several cases the output has been doubled.

The development of the Cerro de Pasco copper district in Peru is being carried on by the Cerro de Pasco Company and, according to the report of the American special agent, writing from Lima, about \$17,500,000 gold has been expended in development by the company, this sum including large amounts paid for machinery bought in the United States.

**SELF-FEEDING SAND BLAST MACHINE.**

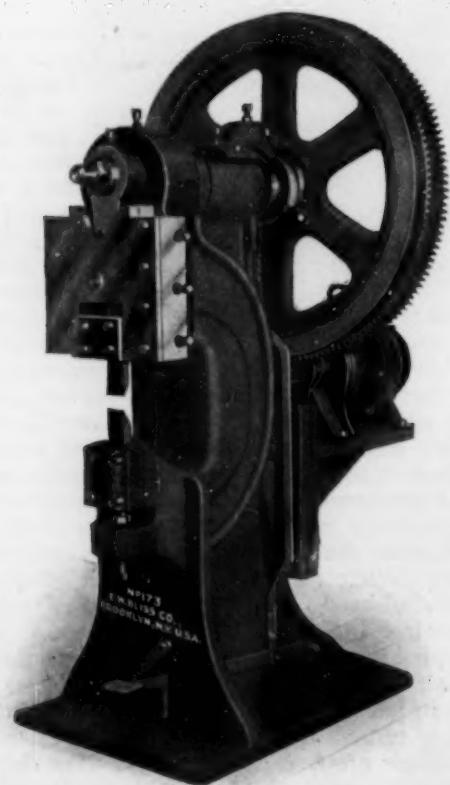
Leiman Brothers, of 141 Centre street, New York City, and 68 Bonykamper avenue, Newark, N. J., are just placing on the market a new continuous, automatic self-feeding sand blasting machine which is adapted for all classes of work in the metal industry. This machine is stated to be very rapid in action, and the quality of its work is of the best. Leiman Brothers have long had in mind the needs of the average plater, chandelier, gas and electric fixture manufacturer, the worker in metal novelties of all kinds, as well as of all manufacturers having use for a sand blasting machine, and after careful study of these needs have designed and built a machine which, it is claimed, not only does the work required in the very best manner and in the quickest time, but which they are enabled to place on the market at \$30. At both addresses the machines are in operation at all times.



THE SAND BLAST.

**BLISS MOTOR DRIVEN SPRUE CUTTER.**

The independent motor drive is rapidly becoming accepted in most large shops as the best form of power from the points of economy and service. Appreciating this fact, the E. W. Bliss Co., 23 Adams Street, Brooklyn, N. Y., are building the motor driven sprue cutter



MOTOR DRIVEN SPRUE CUTTER.

shown in the accompanying illustration. This machine is controlled from a starting box attached to its side. Another consideration is the fact that these machines are sometimes located in foundries at such a distance from the driving power that it is much more convenient to run them by an electric motor, attached

directly to the machine, and avoid extensions of line shafting. The frame of this machine is so designed as to offer no obstruction so that long castings whether set square or at an angle to the main gate can be cut off as readily and as perfectly as those of smaller dimensions.

The cutters used in this machine are simply commercial sizes of bar tool steel, of the necessary section, the cutting part being ground to a bevel edge. This can be done on a grindstone by any laborer. They can be used up almost to the last inch by setting up the screw adjustments. These adjustments permit of so setting the cutters that they will cut off the gate without touching each other, thus effectually preserving the keenness of the edges.

**THE NOBLE ELECTRO-MAGNETIC SEPARATOR.**

An electro-magnetic separator of very simple and substantial construction, which effectually removes all iron and steel from brass borings, turnings, filings, emery grindings, skimmings, washings, sweepings, etc., is here illustrated. It was designed by Benj. Noble and placed upon the market by the Capitol Brass Works, of Detroit, Mich. During the past eight years over 200 of these separators have been installed in some of the largest brass works and smelting concerns in the country, and they



THE NOBLE SEPARATOR.

have been also placed with equal success in pin factories, button factories, soda ash companies and emery companies.

A dynamo is furnished with each separator for generating the electricity, and a rheostat for regulating the current, it being absolutely necessary to adjust the cur-

rent when cleaning out stock containing a very large percentage of iron in order to prevent it from bridging and carrying some of the brass around the drum with it. In works that have electrical equipment this dynamo is wound to be operated by the shop current, providing it is a direct current of not over 110 volts.

The separator should be run at a speed of 55 revolutions per minute, and the dynamo at a speed of 1400 to 1500 revolutions. The power required to operate both separator and dynamo is hardly appreciable, being only about  $\frac{1}{2}$  horsepower.

The stock to be treated is emptied into the hopper, from which it is automatically fed on the revolving electro-magnetic drum, the cleaned stock falling into a receiver in front of the machine. The magnetized material is held until the drum has carried it to the back of the machine, where the current is broken, allowing it to drop by its own weight into a receiver at the back of the machine.

The machine is 3 feet 10 inches high; 2 feet 6 inches

#### HEATING FURNACES.

We here illustrate three of the leading stock designs of furnaces, designed and built by the Strong, Carlisle & Hammond Company, of Cleveland, O., which in their operations cover all of the requirements demanded of a forge or furnace.

The first illustration shows the No. 5A, which is a combination heating furnace adapted to a great variety of purposes, such as annealing, case-hardening, welding, dressing tools, lead hardening, babbitt melting, etc. It is particularly adapted for the tool room and for volume work in manufacturing. A temperature of 1400 degrees Fahr. can be had in 30 minutes, starting with a cold furnace. The burners enter the combustion chamber beneath the heating chamber; the flames strike a baffle wall built through the center, are deflected upward against the oven floor and thence through narrow openings at the side to the heating space above. The heat is distributed to all parts of the work uniformly, at an exact temperature, and maintained with precision for any re-

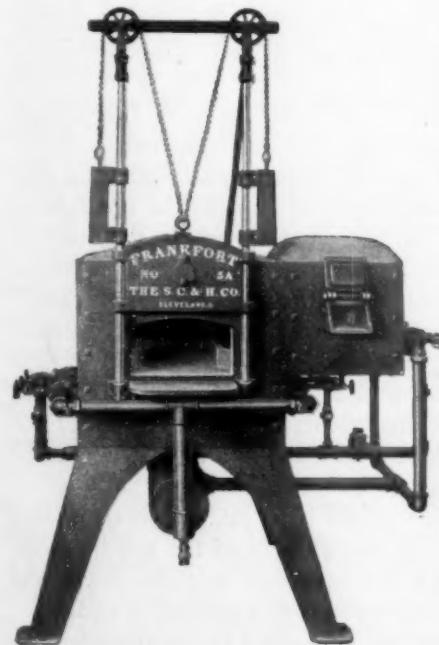


FIG. 1, NO. 5A FRANKFORT FURNACE.



FIG. 2, NO. 4 FRANKFORT FURNACE.

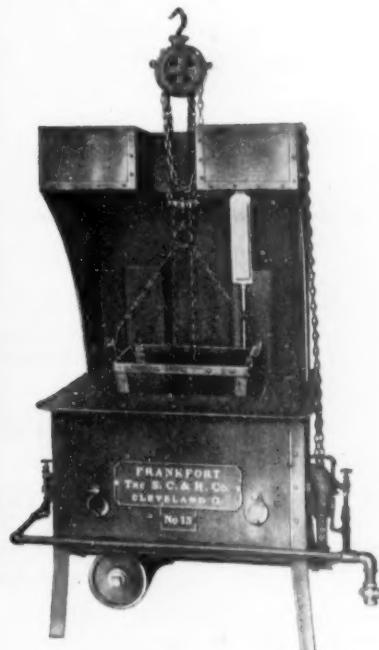


FIG. 3, NO. 15 FRANKFORT FURNACE.

wide, and 2 feet 6 inches in length. The drum is 14 inches in diameter and 13 inches wide. The machine will handle and thoroughly clean from 3 to 4 tons of ordinary brass borings per day of 10 hours.

#### ZINCOID.

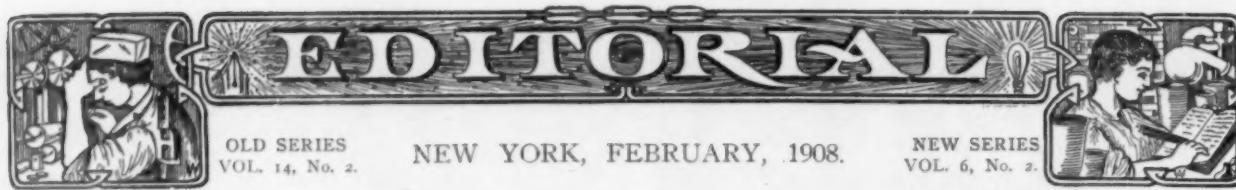
Zincoid is sheet iron coated with a white zinc which gives it an attractive appearance and protects it from rust. The zinc and iron are perfectly alloyed so that zincoid may be stamped and worked without the zinc peeling off. It is cheaper and more attractive than tin. Zincoid is made by the American Nickeloid & Manufacturing Company, of Peru, Ill.

During 1907 the Cerro de Pasco Company, of Peru, shipped 20,152,000 pounds of copper to the United States, most of it via Panama. In December the quantity was \$2,500,000 pounds, the highest of any month during the year. It is expected the total shipments for the present year will be in the neighborhood of 30,000,000 pounds.

quired period. The heating chamber will accommodate two annealing boxes, 8 by 8 by 12.

Fig. 2 is a Frankfort furnace applied to the melting of aluminum and other soft metals. It has a capacity of about 200 pounds. The melting heat may be maintained with exactness for an indefinite period. It is claimed to be an invaluable apparatus for lead hardening, tinning or other purposes when a steady uniform temperature is required.

Fig. 3 is a furnace designed for drawing temper in oil. The capacity of the oil tank is about ten gallons. The construction is such that the burners are completely protected from overflow or spilling. It is provided with a thermometer registering 760 degrees Fahr. Control of temperature is so exact that danger from heating the oil above the flash point is hardly possible. This furnace is also provided with a pilot lighting device that precludes the danger of explosion when starting it. The capacity of the furnace is about 200 pounds of material to each heat. The basket holding the material is lowered and raised by a  $\frac{1}{4}$ -ton chain hoist furnished with the equipment.



# THE METAL INDUSTRY

THE CONSOLIDATION OF  
 THE ALUMINUM WORLD  
 THE BRASS FOUNDER AND FINISHER  
 ELECTRO-PLATERS' REVIEW  
 COPPER AND BRASS

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## "A GOOD LAW UNJUSTLY CRITICISED."

The above is the title of an editorial in our contemporary, *The Jewelers' Circular*, in which we are taken to task for our expression of opinion regarding the U. S. Stamping Act in our last issue. In its opening paragraph our neighbor does us a real injustice; we never even approached that stage of foolishness when we believed that act would "fill the jails with malefactors" convicted because they elected to stamp gold and silver ware in such a way as to convey the impression that it contained more of the precious metals than it actually did. If that act stays on the books until Doomsday it will never occupy much of the court's time, neither will it provide many occupants of the jails.

We are rejoiced to learn, from the second paragraph of our contemporary's article, "that proceedings under this statute necessarily must be slowly and carefully prepared, but that after a test case is made the prosecution of complaints will be just as quick under this part of the Federal statutes as under any of the others which at present keep the district attorneys' offices busy." This would be consoling, but unfortunately it is not true. Once find the gold or silver goods falsely marked and conviction should follow since the evidence is in the goods themselves—a dozen analyses do not take much time. The act provides that those who make and those who handle are equally culpable.

We now learn that all we have said has been wasted because "the main aim and purpose of the law has been accomplished." We are informed that the law "was enacted as much as a preventive as a punitive measure." In our ignorance we are compelled to acknowledge we do not know what that means; but we are cheered with the thought that it must be something good, for it is stated "the mere fact that the law is on the statute books has resulted in the abandonment of the bulk of such dishonest marking of jewelry as was not done because the manufacturers themselves either desired it or wished to continue it, but because there being no law to forbid the practice they had continued it simply because their competitors would not stop." That is a little jumbled, but we think we gather the meaning; it is a beautiful rule—one man does evil and is dishonest because the other fellow does evil and is dishonest, and one man becomes honest just as soon as there is no money in being dishonest. We are not quite certain, but we presume that is one result of the working of a "punitive" law; we hope punishment will not be meted out to our neighbor. (We suppose the poor printer will again be accused of a crime he never committed.)

We are mildly surprised to find the statement that a law compelling all articles of precious metals to be assayed

and stamped is "impossible of attainment in this country, even as a State statute." Is it possible our contemporary never heard of the pure food laws? Those laws have been executed and yet they compelled accurate marking of contents. A stamping act could be drawn upon identically similar lines and it could force the truthful marking of gold and silver goods; the present law is excellent as far as it goes, but the trouble is it goes such a mighty little way.

While *The Jewelers' Circular* has no faith in the enactment in the future of an adequate stamping act, it has, itself, succeeded in most admirably christening the present act—it is a "punitive" measure.

#### A VALUABLE TRADE SUGGESTION.

From far off China comes a trade suggestion which bears all the indications of being valuable. It has passed the experimental stage and proved its business availability. The idea originated with a British concern and by them has been found to be admirably adapted for trade purposes between the home firm in England and the customer in China. The scheme is simple, and therein rests its charm—it is reliable, and that quality takes nothing from its attractiveness.

The method is outlined in a report by the American Consul, Wilbur T. Gracey, of Tsingtau, who states that a British firm recently made a large importation of electroplated and sterling ware from an English firm, and also a large quantity of jewelry for sale to wealthy Europeans and Chinese in Shanghai. The goods are sold at the same price as in the home market. So far there is nothing unusual in the transaction, but here enters the novelty. Arrangements have been made with the London store by which persons in that city, wishing to send presents to their friends in Shanghai, or elsewhere in the Celestial Kingdom, can make their purchases in London and the goods will be delivered to the friends in China. But the goods purchased are not sent to China, as might at first be supposed, but are taken from a duplicate stock kept in Shanghai. The plan works both ways, and residents of Shanghai can select their goods in China at London prices, and have duplicates delivered to their friends in England from the London shop. Very fully illustrated catalogues are kept at each end of the line, that in London showing just exactly what is in stock in Shanghai, and vice versa.

The Consul states the arrangement is filling a long felt want, and that there is an excellent opportunity for an American house to follow in the same path. He is of the opinion that if goods could be ordered and paid for in China and delivered to friends in America from stock here, or the contrary, it would be a great boon to residents of China who wish to remember friends in the United States.

The above is all very true; but if a present were delivered from a New York house, of Chinese articles, the sentiment would be removed from the entire transaction, and the recipient would be hard pressed to make himself believe that that particular piece really did come

from China, when he knows he could buy the same thing himself at the same shop. The plan certainly possesses one very great and important advantage—it overcomes all the customs difficulties. Nevertheless, since the plan works in England, it might also find favor here.

#### COLOR HARMONY IN PLATING.

The wise man said to the sluggard, "Go to the ant for wisdom." Had he lived in these days he might well have said, "Go to the flower, thou plater, consider its hues and learn of the harmony of colors."

The plater now has at his disposal all the colors of the rainbow and a few that were never seen in the firmament above or the depths below. Having such a profusion at his command it is small wonder he uses them with a prodigality that knows no limit. He cheerfully mixes his colors, groups the results, stands back and gazes at his own creation in dumb admiration. He does not know he has violated all the laws of harmony and that his "creation" will be pronounced an abortion by the first artist who sees it or the first one who has an appreciation of the balance in nature.

No single flower, no matter how gaudily painted it may be, ever shows a spark of color not in perfect harmony with its surroundings. The colors and tones blend, one with the other, and we say the effect is beautiful. The plater, with his dips and lacquers and finishes, has all these colors, but his work is not always pleasing. The trouble is he mixes his paints in too promiscuous a fashion; a primary color he will use with a shade of another when the two are not in harmony anyhow. Nature never makes a blunder of this kind. If the plater would devote a little time to the study of complementary colors he would find his work vastly more interesting and pleasing, even when viewed by those who know nothing whatever about the technical side of the question; while the untrained eye cannot develop a color scheme it can appreciate a well executed one.

It is a peculiar fact that, while nature commits no faults when handling colors, so the plater's own solutions will make no error unless they are meddled with in an injudicious manner. A great variety of colors can be obtained by successive dippings in the same bath, as is well known to all platers. But with all the changes possible there is no mistake made in the blending provided man will let things alone; as soon as he interferes there is trouble that makes the eye of the beholder ache. A piece of brass dipped repeatedly in a bath will receive a different coloring at each dip; the colors may be bright or dull, but it is certain that at each stage, considered by itself, there will be absolute harmony.

So it would seem that nature, working in the laboratories of the flower and the chemical tank of the plater, cannot make a mistake when using her own brush and pigments—it is only when man, in his clumsy way, assumes direction of affairs, that failures occur.



## LEAD IN GOVERNMENT MIXTURES.

To the Editor of THE METAL INDUSTRY:

In your periodical of January, 1908, you give a table of Government alloys. In glancing over the list I note there is no lead whatever given. Having been told that lead is used I take the liberty to inquire whether any of your readers who possibly have worked at some time in the Government shops are able to enlighten several of your readers on this question. Some years ago a writer in the *American Machinist* brought up this subject and asserted that they used lead where machining was called for, although the specifications did not call for lead. Take for instance the two-to-one mixture; it seems to me this would prove troublesome. The question in the *American Machinist* was, to the best of my recollection, on the 90 copper and 10 tin alloy.

J. G. NIEDERER.

Arlington, N. J., February 6, 1908.

The above letter was referred to Jesse L. Jones, of Wilmerding, Pa., who replies as follows:

I have read Mr. Niederer's letter with much interest as I was formerly with a firm that did much Government work. The officials and inspectors of the Navy Department are, as a rule, disposed to be liberal in their rulings and where their instructions will permit it, and the castings are not required to be of the greatest possible strength, lead is allowed to be present in such amounts as will facilitate machining. But where strength is required, especially in the 88-10-2 mixture, lead is rigidly excluded and analyses made on each lot of 500 pounds of the castings for the purpose of ascertaining that no lead is present. In scupper pipes, drain pipes, etc., lead is allowed, as it makes the castings more non-corrosive. In the case of certain valves, etc., where 88-10-2 is specified and great difficulty experienced in cutting the thread, a mixture of copper 87, tin 7, zinc 4 and lead 2 has been allowed. Many valves, however, have to be made of the 88-10-2 mixture.

JESSE L. JONES.

Wilmerding, Pa., February 8, 1908.

## "BASSITE."

To the Editor of THE METAL INDUSTRY:

In your January issue I note a discussion of the analysis of "Bassite" which you published in your December issue. I think the chemist must have been rather careless to have overlooked the manganese which is present. We analyzed this material November 27, 1907, and found manganese 1.7 per cent., with the copper about this much lower than the published analysis.

G. M. THRASHER, JR.,

Chief Chemist Western Tube Co.

February 1, 1908.

To the Editor of THE METAL INDUSTRY:

I would say that the second analysis made by another chemist here shows antimony and manganese in amounts less than  $\frac{1}{2}$  of 1 per cent. Possibly it is to this Mr. Jones refers in his statement. We have not done anything with the matter since writing to you before, except to make a few castings, and we cannot see anything in the quality of the metal as superior as the makers of Bassite claim. This, however, is simply an opinion which is not substantiated by any physical test, so that it is not really of value.

DETROIT LUBRICATOR Co.,

January 6, 1908.

By W. M. Corse.

## ALUMINUM.

To the Editor of THE METAL INDUSTRY:

I am in receipt of a volume on Aluminum which you sent me, and which is issued by the Pittsburg Reduction Company. I am surprised at the many different items of interest contained in this volume, and which bears directly on the handling of metals. I wish it were possible that we might have like books issued on the various other metals which are used in the brass foundry. It is quite true there are many books issued which attempt to give the necessary information, but I do not know of any that even approach in any way the detail contained in this volume on aluminum.

SUPERINTENDENT.

New York, January 8, 1908.

## NEW BOOKS

## MINERAL RESOURCES OF THE UNITED STATES IN 1906.

The twenty-third annual volume of the series, Mineral Resources of the United States, published by the United States Geological Survey, is now passing through the press. This volume contains a statement of the production of mineral substances in the United States during 1906.

Practically the same form of arrangement has been preserved in all of the twenty-two preceding volumes of the series, and it has become so familiar to the mining fraternity as to render any description unnecessary. But for those to whom this volume comes as a new book of reference it may be explained that the book is divided into chapters, each of which treats of a separate mining industry for the whole United States. The student who consults this report to find a combined statement of the mineral resources of a given State is referred to the tabular statement of output by States in the summary and to the index, in which, under each State, is a list of the minerals produced therein. The effort is also made to show the conditions of the domestic industry in relation to foreign conditions in the same mineral industry.

It is important, also, for the new reader to know that this volume is simply the consolidation of the separate chapters after they have been published in pamphlet form, frequently months in advance, and that these pamphlet reports, and not the final volume, mark the dates at which the reviews become available. Further, for greater statistical promptness, it is the custom of the Survey to give the principal figures to the public press in advance of the publication of the chapters in pamphlet form.

In 1880 the mineral products of the United States were valued at \$364,926,298, and in 1906 this value had risen to the immense sum of \$1,902,517,565. This is the value of the mineral products in their first marketable condition, and is shown in the book in a large tabular statement giving a summary of the production of the several States. Of the States, Pennsylvania ranks first with a total mineral output of about 30 per cent. of the total. Ohio is next with 11 per cent.; Illinois with 6 per cent.; New York and West Virginia with 4 per cent. each; and then follow Montana, Colorado and Michigan with 3.5 per cent. each; Alabama and California produce 2.5 per cent. each. But the output of the lowest of these States was in excess of \$50,000.



## CORRESPONDENCE

IN THIS DEPARTMENT WE WILL ANSWER QUESTIONS RELATING TO THE NON-FERROUS METALS AND ALLOYS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.



### METALLURGICAL.

Q.—Will you give us a formula for making brass for spinning? We make brass bowl covers for cream separators and these crack a little in the rim while being spun to the desired flare.

A.—You do not state whether you wish a sheet brass or a sand cast brass that will stand being flared a little. If the former, what is known as cartridge brass, made from horsehead zinc, will no doubt be satisfactory. Detailed information of alloys for rolling purposes is found in the December, 1907, issue of *THE METAL INDUSTRY*, page 376. Sand castings made from manganese bronze are often ductile enough to withstand considerable mechanical shaping.—J. L. J.

Would you kindly let us know a mixture for casting brass anodes for warm brass plating solution.

A.—The best formula for brass anodes is 66 parts Lake copper and 34 parts Bertha spelter. A pattern should be made up in wood and then the anodes cast in coarse sand. This makes them more porous, and they will be found to yield up their metal more readily than rolled anodes.—C. P.

Q.—Kindly give us a mixture for water tap jackets that will stand the heat. We understand they are used in a copper mine smelter and are sometimes made of iron or steel.

A.—A good mixture for cast iron water jackets castings would be  $\frac{2}{3}$  No. 1 foundry pig and  $\frac{1}{3}$  good soft scrap. The chief danger to which such castings are exposed is that of cracking, and they must be soft and tough. Water jackets are also made of rolled sheet steel or copper. Sheet steel is attacked by the sulphur fumes in the melting operations and the plates are liable to buckle. Copper is less liable to corrosion.

J. L. J.

Q.—Is there a process for galvanizing small iron goods which requires no machinery, such as the Sherardizing process, and which is not done by electroplating, but simply by dipping the iron into the zinc?

A.—We presume you refer to the process known as "hot galvanizing," which is fully described in the book on "Galvanizing and Tinning," by Flanders, which we can send for \$2.50. There are only four methods of galvanizing—1. Hot galvanizing, dipping the article into molten zinc. 2. Cold galvanizing, or the electroplating process. 3. Sherardizing, or coating with zinc by packing the articles in a retort in zinc dust and heating to a temperature below the melting point of the zinc. 4. Vapor galvanizing in which the articles are exposed in a coating chamber to the vapor given off from a mixture of zinc dust and finely divided carbon placed in a generator.

J. L. J.

Q.—Are the mixtures given below suitable for the purposes mentioned? No. 1 for machinery bearing contains tin 83, copper 8 and antimony 9. No. 2 for

railway bearings contains copper 2, tin 31, antimony 13 and lead 54, and No. 3 for dynamo and motor bearings contains lead 80, tin 5 and antimony 15.

A.—The mixture known as Admiralty Special, tin 83, copper 8 and antimony 9, is an excellent babbitt but very expensive and of too high a melting point for light sections or large areas. The mixture lead 80, tin 5 and antimony 15 is the well known Magnolia formula. It is excellent but too brittle for babbitt flanged bearings. Sawdust is as good a flux as can be used on babbitt, and if the babbitt is to be put on the market, molds of very fine finish should be used.

J. L. J.

Q.—We would like to know at what heat copper should be poured to make an ingot without blistering, and also what is the best flux for it.

A.—Copper is poured into the molds at a moderate heat to avoid "cutting" the molds. The blistering or rising in the molds is due to insufficient poling and not to the heat of pouring. Silicon-copper is the best flux for producing a sound sand casting in copper.

J. L. J.

Q.—We would like to know the best method of re-nickeling and filling iron castings that have already been nickelized and found to contain blow holes. We have filled the cavities with lead but in the polishing process the same invariably becomes loosened.

A.—Our own practice is to use an alloy of lead 95 and antimony 5 for filling such holes. It does not shrink as much as pure lead and is not liable to become loosened in polishing. It may be plated but the surface where the hole is may be detected, and on the whole the results are only partially satisfactory.—J. L. J.

Q.—(1) What do you recommend as the best mixture for bell metal? (2) What process do you recommend for hot tinning small iron work? How is the smooth, glossy surface obtained?

A.—(1) Standard bell metal mixture is Straits tin 22 pounds, lake or best electrolytic copper 78 pounds. (2) The fine surface on small cast iron work is obtained by very careful preparation of the work before tinning. The castings should be well pickled to remove sand and scale, then polished by rumbling with gravel first and then with scrap leather. Grease is then removed in the lye kettle, the work dipped in muriatic acid for an instant to remove any trace of rust, then into zinc chloride solution and finally into the tin. Two or even three tin pots may be used successively for very bright work.

J. L. J.

Q.—We would like to know the most approved method of manufacturing phosphor tin in 1, 2 and 3 hundred pound lots. We would also like to know at what heat copper should be poured to make an ingot without blistering, and also what is the best flux to make it run fluidly.

A.—Phosphor tin may be made by adding the phosphorus to the melted tin by means of a phosphorizer, after the manner of making phosphor bronze. Copper is poured into the molds at a moderate heat to avoid cutting the molds. The blistering is due to insufficient poling and not to the heat of pouring. Silicon copper is the best flux for producing a sound sand casting in copper. J. L. J.

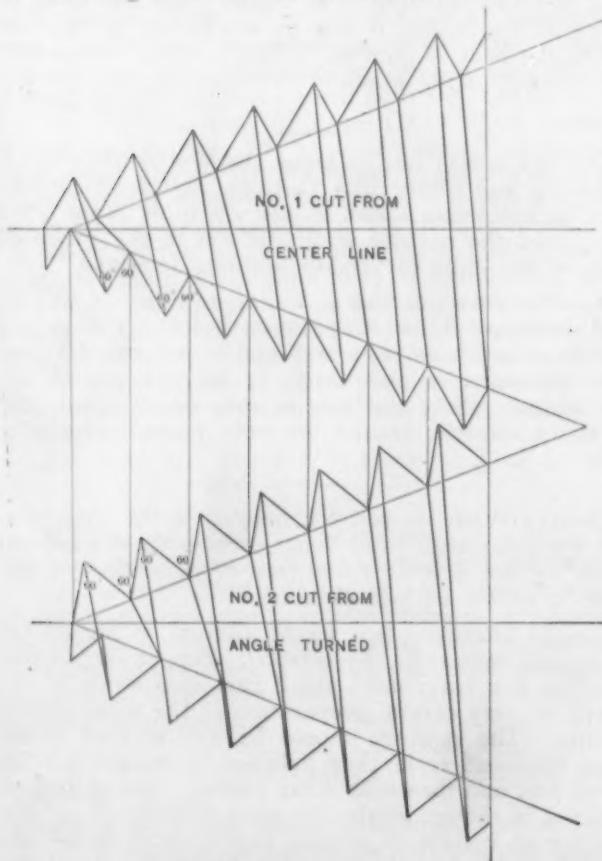
Q.—Can you give us a formula for a white metal to cost not over 15 cents a pound and that would burnish bright and that could be bent?

A.—An alloy composed of equal parts of tin and zinc would probably fill the requirements mentioned. By using Goose tin, which is usually quoted 1 cent below Straits, the price would be within the required limit of 15 cents. J. L. J.

### MECHANICAL.

Q.—I wish to obtain an absolutely perfect threaded joint for a 10-inch pipe and would ask which is the proper relative position of the V-thread, with the center line of work, or with the angle turned?

A.—All V threads are nothing more than an equilateral triangle and for that reason should be cut with



the angle turned. The thread employed has an angle of 60 degrees and to be absolutely correct should be slightly rounded off both at the top and at the bottom, so that the height or depth of the thread, instead of being exactly equal to the pitch, is only  $4/5$  of the pitch. This standard was established by the late Robert Briggs, C. E., in 1862 and adopted by the associations of manufacturers of brass and iron, steam, gas and water works of the United States in convention at New York, December 8, 1885. The accompanying

sketch will explain at a glance. No. 1 is threaded with the tool set from the center line. You will note the intersecting lines are constantly changing their angle, which is very improper and will not make a perfect joint. No. 2 is threaded with the angle turned, consequently both sides of the threads are of equal lengths, thereby forming the equilateral triangle. Simple, isn't it—try and become convinced. E. W.

### CHEMICAL.

Q.—We would like to ask your advice regarding plating batteries. We have been copper plating upon some heavy iron work and are oftentimes called upon to do this plating  $\frac{1}{8}$  to  $\frac{1}{4}$  inch thick. It takes quite a time to get this deposit, particularly when running at the rate of 10 hours a day. A good deal of time would be saved were we to connect the tank to the batteries over night, and disconnect and run by dynamo during the day. The tank we wish to use in this case holds 100 gallons.

A.—Any good standard storage battery could be used for your purpose. This could be charged during the day and connected to the tanks at night, so that the work would be continuous. This method is in successful operation by manufacturers of silver deposits upon glass. We would advise you to correspond with reliable makers of electro-plating supplies as to the batteries most used for this purpose.—C. P.

Q.—We have trouble with work spotting, which has been copper plated and oxidized, using sulphate of potash for the oxidizing and cyanide solution for the plating. Please suggest how we can get away from this.

A.—The spotting out noted is due to the cyanide of copper solution becoming impregnated in the pores of the metal; this works up through the oxidize even when lacquered during the moist weather. The only method for you to pursue is to boil the articles out in cream of tartar, 1 ounce to the gallon of water, or immerse after oxidizing in a warm lacquer thinner for a short time before lacquering. You will find as the days grow cooler you will not be troubled so much with spotting out.—C. P.

Q.—(1) I want a cheap silver dip for brass buckles to be dipped in large quantities. (2) I also want a rose gold solution for brass chased buckles.

A.—(1) You are no doubt aware that only slight deposits of metal can be obtained from immersion solutions; but with care and very soft brass wire scratched brushes the articles may be lightly brushed. For silver dip prepare a saturated solution of bisulphite of soda in warm water until 20 or 22 degrees Baume is reached. Then prepare a saturated solution of nitrate of silver and add slowly until the solution no longer absorbs it. Then add a little carbonate of soda until the solution is neutral. Use the solution cold; cleanse and dip all articles before silvering. (2) For a rose gold dip cleanse your buckles and copper plate for 10 minutes in a good cyanide of copper bath. Burnish the high lights; then immerse in a dip gold solution prepared as follows: Dissolve 10 pennyweights of chloride of gold in  $\frac{1}{2}$  gallon of water containing  $1\frac{1}{2}$  ounces of cyanide of potassium, and in another  $\frac{1}{2}$  gallon of water dissolve 4 ounces of bicarbonate of potash and 16 ounces caustic potash. When dissolved mix the two solutions. Use the solution at the boiling temperature, adding water to make up for the loss by evaporation. Immerse the coppered buckles in this bath

for a few seconds and a fine rose gold will be the result.—C. P.

Q.—Kindly favor us with a formula for producing a green verde on plain brass and copper fixture parts. The effect we desire is a solid green with a slight flakey appearance. The finish we desire is that used on portables and is very smooth.

A.—The smooth finish you refer to is the wax finish which is produced as follows: Dissolve beeswax in turpentine with the aid of heat until a very fluid paste is obtained. Now brush lightly over the previously lacquered surface. Allow to harden and then polish with a slow running canton flannel buff wheel. For a verde finish try the following: Copper and oxidize your surface and then immerse in a solution composed of 4 ounces chloride of zinc, 2 ounces sulphate of copper, 4 ounces sal ammoniac and 1 ounce glycerine in 1 gallon of water. The salts may be dissolved in a little of the water, used warm. When the solution has been prepared add just a little water ammonia, stirring rapidly until the solution is turbid. Now immerse the articles—after coppering and oxidizing—and hang up for a few minutes until the green commences to form. While moist stipple the surface with a painter's sash tool, using a little of the solution in the proportion of 1 part to 3 parts of water, and add 2 ounces common salt and a few drops of glycerine to a pint of the mixture. Use this for stippling purposes only. Do not moisten the brush too much. Allow to dry after stippling, which will take 15 minutes or more. Then lacquer by dipping or spraying; do not brush. Afterward wax as mentioned above.—C. P.

Q.—I send a back pants buckle and would like to know how the blue finish is produced.

A.—The blue finish is produced by heat in the following manner: The buckles are first highly polished. Then take finely sifted wood ashes and heat them in an iron receptacle over a clear coal fire. String up your buckles and bury in the ashes until sufficiently hot; then withdraw. The blue is caused by the action of the air; about 600 degrees is necessary for the best results. If this does not prove satisfactory use powdered animal charcoal in the same manner.—C. P.

Q.—Can you give me a reliable formula for making heavy deposits of zinc? I want this for such goods as sheet iron, tubing, etc.

A.—For electro-galvanizing the following formula gives excellent results:

Water .....	1 gal.
Commercial sulphate of zinc.....	2 lbs.
Commercial sulphate aluminum..	1 oz.
Glycerine .....	1/4 oz.

The solution should be prepared with warm water. The anodes should be cast zinc in the proportion of 99 parts of zinc to 1 part aluminum. This alloy gives the whitest deposit. The solution should be made up about 10 hours before using and it is advisable to hang the anodes in the solution for this length of time since, by the action of the solution on them, the free acid is dissolved.—C. P.

We send you samples of tips which we manufacture. We make quite a few of these and nickel plate them on tin, but have always had considerable trouble from the fact that they blister after having been nickelized, although they appear smooth when finished. These are drawn from steel and our usual process in finishing is to first clean them with caustic soda, then they are rinsed with water and go in to a flux made from muriatic acid and zinc;

then they are tinned in a single vat. In the plating process we first clean them in a solution of sal soda, then in clean water, then into a potash solution and rinse. They are then plated and buffed.

A.—From experiments made with the unfinished tips we are of the opinion that your trouble results from imperfect cleaning. In cleansing tin with potash an oxide forms that is hard to remove unless you use some mechanical method; this is what causes the blistering. Try final cleaning with Kalye or an electric cleaner. Another method you might try after cleaning is to immerse the articles for a few seconds in a blue dip consisting of water 1 gallon, cyanide 2 ounces, and yellow oxide of mercury 1/8 ounce. This gives you a thin film of mercury. Rewash and then immerse in the nickel bath as usual; this may do away with the blistering.—C. P.

Q.—(1) Let me know the best method of rolling work bright in water tumbling barrels. Also (2) give me a few points on the method of rolling brass castings smooth.

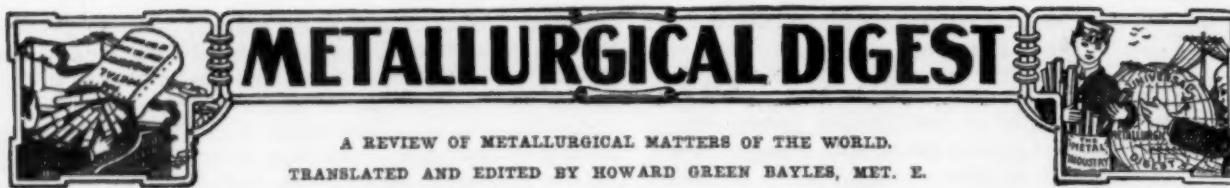
A.—(1) If the articles are made from iron or steel there is nothing better to use than sal soda in your water. For brass use borax water or a weak solution of plater's compound. Steel balls, as used in bicycle and other bearings, are extensively used in polishing brass articles by tumbling. As these balls are hardened and polished they act as burnishers when placed in the tumbling barrel. Horizontal or angle barrels give the best results. (2) Small brass castings can be tumbled by either method mentioned. Leather meal or scraps with pulverized rouge is used in the dry tumbling of brass, iron and steel goods.—C. P.

Q.—(1) We send you a chain which was sent to us to be refinished. Kindly advise us how to proceed with this work. (2) What is the finish on the button we send?

A.—(1) To refinish the chains as per sample it will be necessary to remove the rust with hydrochloric acid and then wash and dry out and tumble them with leather scraps in a tumbling barrel until sufficiently polished. Then replate in a bronze solution which may be prepared by adding carbonate of zinc dissolved in two parts of cyanide of potassium, using as little water as possible to obtain solution, and then adding to the regular copper solution so that you have from 1/4 to 1/2 ounce of zinc in each gallon of solution. A few minutes plate is all that is necessary to give as good results as the sample. Afterward lacquer. (2) The button is a bronze finish and can be plated in the same solution as the above.—C. P.

Q.—We make name plates and etched metal work, and have met with a difficulty in silver plating after the metal is etched. The cyanide in the solution removes the resist, thereby destroying our design. Our resist, which is made of equal parts of asphaltum, rosin and beeswax, stands copper solution or any other acid solution, but will not stand silver cyanide solution long enough to have a well-plated surface. We understand your esteemed publication is an authority on matters of this kind and, therefore, appeal to you, after having exhausted the knowledge of expert platers in this city.

A.—One of the best resists we know of is common air drying japan thinned with benzole, not benzine. In the silver trades a stopping out varnish is made by dissolving gum copal in acetone and then coloring with aniline blue or purple so the resist can be seen plainly when it is applied. This will withstand cyanide solutions. The air drying japan can be removed with benzine, and the copal varnish with hot potash solution.—C. P.



### METAL ETCHING.

Translated from *Der Metallarbeiter*

By HOWARD G. BAYLES.

(Concluded from page 30.)

#### PREPARATORY WORK.

Of the highest importance in etching work is the preparation of the surface. A coating must be used that is not attacked by the etching solution, and that may be relied on not to scale from the metal or permit the acid to work under it. The coating must be removable, in turn, by some means that will not affect the metal. One common preparation will serve as an example. A mixture of 2 parts beeswax, 2 parts gum mastic and 1 part asphalt melts at about 140° F. and is soluble in turpentine, ether or benzine. The article to be etched is rubbed over with finely sifted ashes or pumice, and is then thoroughly cleaned from all dirt and grease. Zinc is cleaned with warm caustic soda. Copper is warmed and rubbed with a mixture of caustic potash and fine chalk until this sticks everywhere. The caustic and chalk are washed off with a running stream of clean water. After drying, the metal is ready for the protective coating.

#### DEEP ETCHING.

For deep etching, the cleaned article is wrapped in fine linen and then in dry taffeta silk and slightly warmed. The surfacing material is then rubbed lightly over the wrapping and is melted by the heat of the copper, soaking through the pores of the linen and taffeta and forming a thin layer on the metal surface. The heating of the copper plate must be done with care, as too high a temperature will drive off the ingredients that insure a good adhesion to the metal. It is easy to recognize a plate that has been overheated, as after cooling it has a matte surface. The subsequent scratching of the picture or design as well as the etching causes the surfacing to chip and scale off, so that it is really a saving of time, when a plate is not perfectly coated, to clean it and start over. As a good thin coating is very transparent and permits the gleam of the metal to be seen, it will make it much easier for the engraver to see what he is doing if he blackens the coating with soot or lampblack before beginning to work with the tool.

Another method of applying the coating is to dissolve it in turpentine and put it on the copper with a soft brush. When ready to begin the acid treatment, a border or edge of soft wax is built around the plate, making a tray of it. The acid is poured into this and the tray tipped back and forth in order to bring constantly fresh acid in contact with the exposed metal surfaces.

It is a most important point not to coat the metal too heavily, otherwise there will be an inevitable scaling of the protective surface when the graving is done. Small pieces may be experimented on until the right method is learned. The very thinnest coating that is unbroken will be the best.

#### WORKING OUT THE DESIGN.

The working out of the designs to be etched is done with a graving tool. Several variations on this method that have come into use of late are described below. The graving tool is a thin, needle-like piece of steel, which is fastened, for better grip, in a wooden handle, much like

a lead pencil. For broader lines, the needle has a chisel end, and for exposing whole surfaces, a small lens-faced planer is best. The tool should not have the sharpness of a needle, as it is not necessary that the metal should be scratched at all. On the contrary, a rounded point like a needle's head, that makes a thin line but does not cut the metal at all will permit the quickest and best work. For the first outline sketch, the finest tool is used, and as one goes over and over the plate, increasing the detail and darkening shadows, the broader tools are used, the planer coming last where a solid black color is to be produced. In order to draw a circle, a small metal plate, having a center point, is held or cemented to the plate, and the compass point placed on this. It may be easily removed after use. If mistakes are made in the graving the wrong lines may be painted over with a brush dipped in a turpentine solution of the wax mixture.

One of the above-mentioned variations on the common method of etching is to prepare the copper plate with a thin plating of gold which, as we have said, resists most acids and etching solutions. The graving on the gold ground is done with a fine needle of hard steel or even with a diamond point, and much finer and more delicate work can be done than with the usual waxed surface.

An easy way of following a pattern is to lay a sheet of thin tough paper over the prepared plate and the stencil over this. The design is gone over lightly with a sharp pencil and the design shows in the wax after removing the paper. It may then be graved out quickly and easily.

#### HIGH ETCHING.

For relief or "high etching" one employs a sharpened goose quill. The metal surface is painted over with a coat of gum arabic and tin-white and the design is scraped clean with the quill. A layer of asphalt varnish is then applied, which sticks only to the exposed metal. The gum and tin white are washed off in water, and the plate is etched for a few seconds in a 1-100 sulphuric acid solution. The preliminary preparation of the tin white consists in grinding it with soapy water. After being so prepared, it must be kept tightly sealed from the air until used. Care must be taken that the goose quill has no cracks or splits.

While there are many etching methods for special classes of work, they have little interest for the general workman, and so are not described here. The only process of importance remaining is the galvanic etching.

This is operated in the same way as any other electroplating, with the difference that the plate to be etched acts as a soluble anode. Sufficient current will be derived from a battery 3 or 4 Bunsen or crow-foot cells, connected in series. The negative (zinc) pole of the battery is connected to the cathode plate, and the positive pole to the plate to be etched. The bath is usually made of a dilute solution of the chloride of the metal that is to be etched. With silver, the nitrate is used, and in any case a couple of drops of acid are added.

The *English Mechanic* gives a hint to brazers. Dry borax should not be used in brazing, as it swells when heated, forming a porous joint. The borax should have been previously melted in an iron or clay crucible to a clear liquid. It will not be clear until all water has been expelled.

# Associations and Societies

REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

The Foundry Supply Association. President, E. H. Mumford, E. H. Mumford Co., Philadelphia, Pa.; vice presidents, W. S. Quigley, The Rockwell Engineering Co., New York city; H. R. Atwater, The Osborn Manufacturing Co., Cleveland, O.; William Chamberlain, The Garden City Sand Co., Chicago, Ill.; treasurer, J. S. McCormick, J. S. McCormick Co., Pittsburgh, Pa.; secretary, H. M. Lane, 1137 Schofield Bldg., Cleveland, C.

The object of the association is to hold an exhibit of foundry supplies and equipment at the time of the meeting of the American Foundrymen's Association.

The executive committee of the A. F. A. have accepted the invitation of the Toronto foundrymen to hold the 1908 convention of the A. F. A. in Toronto. The allied organization, that is, the Brass Founders' Association and The Foundry Supply Association, will meet at the same time.

The Foundry Supply Association will hold an exhibit of foundry supplies and equipment at this time, for which very extensive preparations are now in hand. It was at first intended to hold the meeting the first week in June, but in order to avoid the crowded condition of the hotels in Toronto to that week, on account of the fact that the Circuit Races have been set for that time, it has been decided to hold the convention the second week in June.

On Jan. 23, in the rooms of the Canadian Manufacturers' Association, Toronto, was held a meeting to make preliminary arrangements for the convention of the American Foundrymen's Association. The meeting was called by L. L. Anthes, vice president of the American Foundrymen's Association, and the different organizations and bodies interested in this convention were represented. Owing to illness and important business engagements several of the men most chiefly interested were not present. These included the chairman of the Civic Reception Committee, the Commissioner of Industries, and the chairman of the Foundrymen's Section of the Employers' Association.

Those present were L. L. Anthes, Toronto Foundry Co.; Dr. Moldenke, secretary of the American Foundrymen's Association; H. M. Lane, secretary of the Foundry Supply Association; C. H. Wheaton, Dodge Mfg. Co., Toronto; S. H. Chapman, Ontario Wind Engine & Pump Co., Toronto; E. G. E. Holker, Wilkinson Plow Co., Toronto; David Reid, Canadian Westinghouse Co., Hamilton, Ont.; W. R. Bears, Detroit Foundry Supply Co., Detroit, Mich.; F. W. Moffat and J. K. Moffatt, Moffat Stove Co., Weston; J. P. Murray, Ed. Fleysing, chairman Toronto Branch C. M. A.; J. S. McKinnon, chairman Reception Committee C. M. A., all three representing the Canadian Manufacturers' Association; J. C. Armer, editor Canadian Machinery.

Dr. Moldenke explained the character of the American Foundrymen's Association, and pointed out that its objects were purely educational. He reviewed the history of the association, and pointed out the influence it had had in the development of the foundry industry in America and also in other countries. He gave some hints in regard to arranging for the programs, and suggested that this year more attention be paid to the educational features of the convention than heretofore. He also gave some hints in regard to preparing the social features.

H. M. Lane then spoke in the interests of the Foundry Supply Association, and pointed out that these two associations had worked together during the past two years, and enlarged upon the value of the exhibits made by his association at the conventions. He pointed out that the makers of foundry machinery and dealers in foundry supplies at this convention exhibit everything new, with the result that very valuable information was obtained by the visiting foundrymen in regard to new equipment and methods of manufacture

in their foundries. He said that the Supply Association would be very pleased to co-operate in any way with the local foundrymen in providing entertainment for the visiting foundrymen.

Mr. Murray spoke in the interests of the Canadian Manufacturers' Association, as also did Mr. Freysing, both gentlemen pointing out the enthusiastic way in which the Canadian Manufacturers' Association had taken up the matter, and promising the utmost support as far as this association was concerned.

The question of a badge was considered, and Mr. Lane submitted a specimen badge, which he had designed. It differs from the one which was used at the last annual convention in Philadelphia in that instead of using numbers, the name of the company represented by the wearer of the badge is printed right on the badge. One section of the badge is also representative of Canada, the design being a beaver surrounded by a wreath of maple leaves, and the words "Toronto, 1908," on it.

The facilities for the holding of the sessions and for making the exhibits were discussed, and all those present were very favorably impressed with the arrangements which could be made at the Toronto Exhibition grounds. Mr. Lane gave some ideas of the magnitude of the exhibits which would be made by pointing out that \$12,000 was spent by the association last year in the mere placing and arranging of the exhibits.

Those wishing to exhibit should communicate with H. M. Lane, secretary of the Foundry Supply Association, whose address is 1924 Prospect avenue, Cleveland, O.

Toronto is an ideal convention city; the exhibit buildings and the surrounding park are owned by the city, and two of these buildings are tendered for the use of the Supply Association, while the auditorium is to be used for the reading of papers before the different associations. This auditorium is of sufficient distance from the exhibit, so that the members will never be disturbed by any noise which may come from the exhibit buildings.

**PHILADELPHIA FOUNDRYMAN'S ASSOCIATION.**—President, Thomas Devlin, Thomas Devlin Manufacturing Company, Philadelphia; vice-president, Alex. E. Outerbridge, Jr., Wm. Sellers & Co.; treasurer, Josiah Thompson, J. Thompson & Co.; secretary, Howard Evans, J. W. Paxson Company, Philadelphia. The Association meets at the Manufacturers' Club, 1409 Walnut street, on the first Wednesday evening of every month, except July and August. Topics of interest to the foundry trade are discussed at each meeting. Every one interested in the trade is welcome to attend the meetings.

On the 5th inst. a tri-party novelty dinner was given by the Association at the Manufacturers' Club in honor of the New England and Pittsburg Foundrymen's Associations.

**NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.**—President, A. S. Hills, Haydenville, Mass.; commissioner, Wm. M. Webster, 109 Randolph street, Chicago, Ill. Meetings are held quarterly, the annual meeting being in December. The objects of the Association are the further development of scientific methods in the manufacture of goods, handling of credits, computing of costs and adjusting bad and slow accounts.

**CHICAGO BRASS MANUFACTURERS' ASSOCIATION** is a local organization given over entirely to the brass interests of all kinds. Wm. M. Webster is the commissioner. Meetings are held the last Thursday of each month, and the annual meeting in May.

# PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

## ERNEST A. LEWIS.

Mr. Lewis was born at Rugby, England, on October 10, 1878. When four years old his parents moved to Birmingham, where he was educated at King Edward VI's Grammar School. Afterward he went as a student in chemistry to Mason College (now the Birmingham University) for two years and attended evening classes in metallurgy at the Birmingham Municipal Technical



ERNEST A. LEWIS.

School. He was chemist and metallurgist to Muntz's Metal Company, Ltd., French Walls Works, near Birmingham, for seven years. He left this firm in 1903 and went to the locomotive department of the Midland Railway Company at Derby for one year to reorganize their brass foundry and advise them as to the best alloys to use on locomotives. Since 1905 he has been in business as an analytical and consulting chemist and metallurgist, with special reference to the brass and copper trade. Mr. Lewis has written several papers on copper and its alloys, and is a "Fellow of the Chemical Society" of London, "Member of the Society of Chemical Industry" and a "Member of the Society of Public Analysts and other Analytical Chemists." Mr. Lewis is well known to our readers, as he has contributed several valuable

articles on scientific metallurgy applied to the foundry and rolling mill, the making of alloys, etc.

S. L. G. Knox, of the Bucyrus Shovel Company of South Milwaukee, has been elected president of the Milwaukee (Wis.) Metal Trades and Founders' Association.

## DEATHS.

Thomas Mellon, the eminent financier, died at Pittsburgh, February 4, aged ninety-five years. He was interested in important business interests aside from banking, having been one of the leading men in founding the Aluminum Company of America, the Carborundum Company and the Georgia Bauxite & Mining Company. His son, R. B. Mellon, is now president of the Aluminum Company of America.

Thomas Reed Pickard, head of the foundry department of the Brass Foundry & Machine Company, Fort Wayne, Ind., and for 50 years connected with this company, died January 12, aged 79 years. He was born in Cornwall, England, and coming to this country in 1848 served his apprenticeship as molder with C. & J. Cooper & Co., Mt. Vernon, Ohio. Beginning service in 1854 with the Bass Foundry & Machine Company, then known as Cooper, Bass & Co., he was four years later advanced to the position of superintendent, which he occupied in an active capacity for 44 years. For the past few years he retained his connection with the company as consulting superintendent.

Marshall Halstead, ex-Consul to Birmingham, England, and formerly prominent in newspaper circles, died at Cincinnati, O., on January 29, after an operation for appendicitis. He was about 38 years old, and was a son of Murat Halstead, the noted editor. He resigned his place as Consul two years ago in order to come home and attend to his father, who was and is in feeble health. He was succeeded in the Consulate by his brother about six months ago. He married an heiress, Miss Clara Lunkenheimer.

Just before his death Mr. Halstead was elected to the board of directors of the Lunkenheimer Company.

# PATENTS

## REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

871,241. November 19, 1907. MACHINE FOR FORMING FLEXIBLE TUBING. Salvatore Scognamillo, New York City. In this method of making spiral tubing, means are provided for moving the mandrel on which the tube is formed, instead of moving the material of which the tube is being made.

869,916. November 5, 1907. SHEET METAL STAMPING DIE. David R. Levin, Chicago, Ill. The main object of this invention is to provide a die mechanism which will, at one operation, form from flat sheet metal stock a downwardly flanged box lid or can cap with a short outwardly projecting lip upon its flanged edge. The die will operate upon either plain or enameled stock without wrinkling the metal and without scratching or cracking the enamel.

871,965. November 26, 1907. PAD COVER. G. F. Stewart, assignor to the Manufacturers Machine Company, of Montclair,

N. J. These pad covers are intended for use with buffing machines. Provision is made for easily and quickly removing a worn cover and applying a new one to the pad.

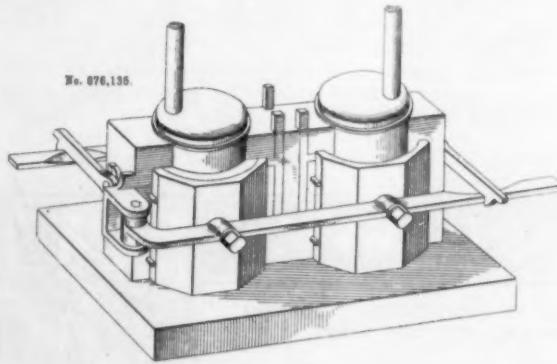
867,763. October 8, 1907. MANUFACTURE OF TUBES. William Joseph Still, Ealing, England. This invention relates to tubes built up of rings or of rings and perforated plates, and it has for its object to improve the joints made between the several rings or plates. The rings are placed together with an interposed layer of a material having a softening point lower than that of the metal to be united, and a flux. The parts—in the case mentioned they are composed of brass rings alternating with copper plates—are pressed tightly together and the whole heated. As the ends of the tube being formed are closed, the heated air in the interior creates a pressure which blows out at the joints the oxide or other foreign matter present and thereby produces

clean surfaces for the action of the jointing metal or alloy. This is spread all over the surfaces to be united.

**874,040. December 17, 1907. METHOD FOR DETINNING AND PRODUCING TIN COMPOUNDS AND OTHER PRODUCTS.** Elmer A. Sperry, New York City. This invention is based on the chemical reaction between chlorine and metallic tin which produces stannic acid. Tin or any tin bearing material, such as tin plate scrap, may be considered as suitable for the supply of the metal. The chlorine in any of its reacting forms is used in carrying out the process on a commercial basis.

**875,677. December 31, 1908. APPARATUS FOR SOLDERING CANS.** Charles W. Sleeper, assignor to the Independent Canning Company, of Eastport, Me. This invention relates to can soldering machines of that class in which a can bottom is soldered to a flanged can body, the flanges of which have been previously coated with solder, by placing the can bottom in position and melting the solder to cause the two parts to be united, and the objects of the invention are to provide a machine capable of treating a large number of cans simultaneously, which will hold the can body and bottom in proper relation to each other during the heating to melt the solder and during the cooling and in which the heat may be applied uniformly to the joint and the cooling may be rapidly affected.

**876,135. January 7, 1908. MOLD.** Julius Bertram, St. Louis, Mo. This invention relates to a water cooled molding machine and the object is to provide a device of this character by which linings for journals or babbitt bearings of any configuration or



description, especially railway car wheel journal bearings, may be cast. The invention further aims to provide a new and useful construction of interchangeable character; that is, the mandrels of the device, forming the bore of the babbitt bearing, may vary in proportions and configurations and also be suitable to the demand thereof.

**876,257. January 7, 1908. MACHINE FOR MAKING FLEXIBLE TUBING.** Carl O. Berg, Chelsea, Mass. In this machine the mandrel is stationary and both sets of rolls are positively driven. Both sets of rolls, as well as the roll of material, are revolved about the mandrel or axis of the finished tubing. This permits the forming of the tubes without imparting any motion to the tubing, except a longitudinal feeding motion off the mandrel or away from the machine, thereby permitting the tubing to be formed of indefinite lengths. The machine carries no dies or other mechanism for changing the cross section of the strips. The strips have the same cross section after they pass the spinning rolls as they have when they engage them, the action of the spinning rolls serving to position each strip spirally upon itself.

**876,931. January 7, 1908. SAFETY COLLAR FOR ABRASIVE WHEELS.** David B. Hyde, Santa Ana, Cal. The object of his invention is to prevent emery or other grinding wheels from being broken by unequal side strain arising from the pressure of the clamping devices which hold the wheel on the arbor. Another object is to safeguard the wheel in case of breakage by preventing the broken pieces from flying and injuring the workman should the wheel be broken. The center of the wheel is

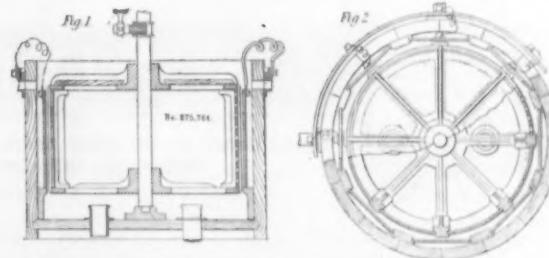
made thicker than the periphery and is convex, while the clamping collar is dished or concaved to fit the hub portion of the wheel.

**874,469. December 24, 1907. SELF-HEATING SOLDERING IRON.** James B. Wheatley, Kansas City, Mo. In this soldering iron the liquid fuel is held in the hollow handle, the burner being mounted on the handle. The iron is so located as to be heated by the burner and a valved conductor connects the burner with the fuel supply in the handle.

**867,781. October 8, 1907. MELTING FURNACE.** Thomas D. Bauscher, Reading, Pa. This is an improved furnace of the collapsible or knockdown type intended for melting lead and other soft metals. It is comprised of four vertical walls capable of being secured together at their meeting edges, to form a rectangular body and having means for suspending a metal holding pot therein. The furnace is especially intended for use where prepared fuel is used.

**867,541. October 1, 1907. PRODUCTION OF CASTING PATTERNS.** Franz Walenta, Bellinzona, Switzerland. A temporary model is made of cheap, soft wood, in which are inserted supporting irons. This is impressed in sand in the usual way and after the removal of the model the mold is painted with cadmium. The entire model is now shaved down to from 2 to 5 mm. and is again placed in the mold. The space is filled up with an alloy of tin and lead. This forms a metal sheath for the model.

**875,784. January 7, 1908. APPARATUS FOR THE MANUFACTURE OF COPPER ELECTROTYPEs.** Sherard Osborn Cowper-Coles, of London, Eng. This invention makes use of a vat, circular in form, the interior of which is fitted with a framework of wood adapted to receive the cases filled with the composition forming the cathodes upon which the impressions are made for the plates. A frame is suspended in the center of the vat in such a manner that it can be rotated. This frame carries the anodes of the



metal which it is desired to deposit; these are perforated to permit free circulation of the electrolyte. The electrolyte is introduced through the bottom of the vat by means of a pump and is projected by centrifugal force into the molds on which the metal is to be deposited so as to remove any air bubbles that may be retained in the recesses thereof.

**876,814. January 14, 1908. AUTOMATIC SCREW MACHINE.** Harry B. Lester, West Hartford, Conn. The object of the invention is to produce a simple, compact, easily operated screw machine of wide scope and high efficiency having tubular spindles that always rotate in one direction, thereby effecting a saving in power, allowing an increase in speed and permitting the use of ordinary right-handed tools, which spindles can be made to feed either simultaneously in order that all of the rods of stock may be operated upon for coincidently producing duplicate pieces or pieces of different lengths, diameters and shapes that require but a simple cut, or to feed progressively in order that the stock may be successively operated upon by a number of different tools which will effect a variety of cuts on each piece. A further object is to so arrange the mechanisms that they will be above and away from the grit produced by cutting the stock, that the spindle bearings will be widely separated to obviate rocking strains due to rapidly rotating rods, and that all the driving be direct and positive without the interposition of levers and applied in such manner that the tools are relieved of interfering and distorting strains, thus insuring accurate cuts at a high rate of speed with a minimum expenditure of power.

874,149. December 17, 1907. MACHINE FOR MAKING SHEET METAL VESSELS. Emile J. Witteboile, of Camden, N. J. This invention relates to machines for automatically securing the bottoms to the sides or body of sheet metal vessels, and more particularly to improvements for double seaming a perfectly flat bottom to the body of a vessel. The invention is especially adapted for securing an oval bottom to an oval body or for securing a bottom having straight sides and rounded corners to a body of similar form. But it is equally well adapted for securing a round bottom to a body of circular cross section, or for securing bottoms of irregular form to bodies having a section of corresponding form.

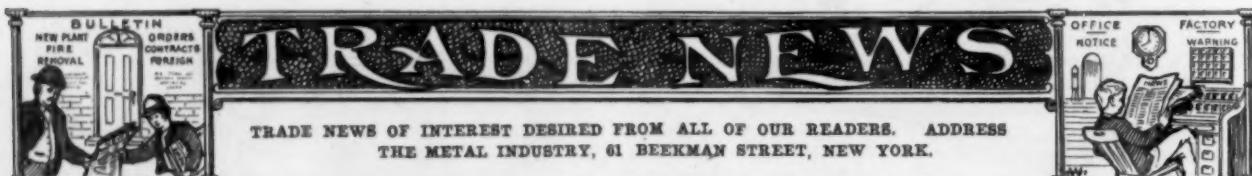
868,729. October 22, 1907. BATH FOR OBTAINING ELECTROLYTIC METALLIC DEPOSITS. Leopold Trunkhahn, Vienna, Austria. In order to increase the adhesion and the lustre of electrolytic metallic deposits, sugars or vegetable saps containing sugar have been mixed with the baths. It has, however, been found that the favorable influence of the addition of sugar only lasts for a short time, and only shows itself again when the bath has remained at rest for a long period. As a result of experiments undertaken in this connection the inventor has found that the favorable influence of the addition of sugar is largely increased and maintained constant when there is added to the latter a ferment, such, for instance, as yeast or barm. A bath containing the following materials in substantially the proportions specified will serve as an example of one bath admirably adapted for use in the practice of my process. 25 kilograms of crystallized sulphate of zinc, 15 kilograms of aluminum sulphate, 1 kilogram of calcium carbonate, 4 kilograms of maltose or dextrose, and 0.5 kilograms of beer barm.

877,673. January 28, 1908. Solder Feeding Device for Can Making Machines. C. W. Sleeper, Lancaster, N. H. This invention relates to solder feeding mechanism for can soldering machines, and is designed for the purpose of feed-

ing granulated solder in the solid form to the interior of can bodies and heads previously assembled and fed beneath the solder feeding device, as by means of a suitable moving chain, the soldering process being subsequently accomplished by melting the solder within the cans by heating means located on the outside. Provision is also made for directing a jet of compressed air into the interior of the can body after the solder has been supplied and before it has been melted, in order to distribute the solder around the outer edge of the can bottom where the seam is formed.

877,073. January 21, 1908. MACHINE FOR MAKING METAL TUBING. E. T. Greenfield, Kiamesha, N. Y. The object of this invention is to provide a machine for making flexible metallic tubing by forming a plurality of long strips of sheet metal spirally one over another. Preferably the tubes are formed from two sheet metal strips. The machine has a set of rotating forming rolls arranged to bend the metal strip spirally to form a tube and a second set of rolls arranged to bend a second strip around the tube formed by the first strip. This second strip breaks joints with the first one. The metal strips before being so bent are curved transversely, the inner strip being placed with its concavity outward while the other has its concavity inward.

877,436. January 21, 1908. MACHINE FOR ENGRAVING OR SINKING DIES. Joseph F. Keller, New York City. Former patents by the same inventor cover a machine for sinking dies of a larger or smaller size than the templet or model from which it is copied. This difference in size results from the fact that the swinging bar carrying the pointer or tracer and the cutting tool is pivoted at one end, the pointer and cutting tool lying on the same side of the pivot. In the present instance the machine is so constructed that the die is an exact reproduction of the pattern. To accomplish this the fulcrum is placed midway between the tracer and the cutting tool or midway between the pattern being copied and the die being made.



William S. Nichols, manufacturer of the "Hercules" portable hoist, formerly of 253 Broadway, New York City, is now located at Hoosick Falls, N. Y.

The Nuss Plating Company, of Harrisburg, Pa., have received the contract for refinishing and repairing all the electric fixtures and art metal work in the executive mansion.

J. H. Gautier & Co., Jersey City, N. J., who have been making crucibles for the past forty-five years, report that their works have been running full time right through the hard times.

The new brass foundry and machine shop of the Kennedy Valve Company will soon be in full operation at Elmira, N. Y. The machinery for the foundry and machine shop is now being installed.

W. H. A. Robertson & Co., Ltd., Lynton Works, Bedford, Eng., are making a specialty of all classes of rolling mill machinery and auxiliary machinery for rolling mills and are arranging their works accordingly.

The American Chasing & Modeling Company, 145 East 23rd street, New York City, are having such a demand for their slush molds that they are working overtime—mostly on work for delivery in the future.

The Eureka Pneumatic Spray Co., manufacturers of the well known pneumatic spray for lacquers, paints, enamels and

japanners, have moved their office and demonstration rooms to 400 Canal street, New York.

The application of the receivers of the Aluminum Press Company, of West Dunellen, N. J., for permission of the court to keep the plant running on work now on hand has been granted. It was asserted that this would be to the best interests of the creditors.

The American Graphophone Company, of Bridgeport, Conn., have shut down a portion of their plant, only running at the present time about one-half the regular force, and only three and four days per week. The reason for this is the stringency in the money market.

Zeh & Hahneman, manufacturers of presses and sheet metal machinery at Vanderpool and Avenue A, Newark, N. J., are one of few shops which have been busy during the whole dull period just passed. This firm only closed up for one day, to take stock, and have been running full time.

A double arbor polishing and buffing lathe which embraces several labor saving features is offered by the Bennett & O'Connell Company, Inc., 97 S. Clinton street, Chicago. Further particulars will be furnished by the manufacturers in their catalog M. Correspondence is solicited.

The business of the Weld Manufacturing Company, Bridgeport, Conn., manufacturers of sheet metal and wire goods, also

dies and tools for special work, has been in the hands of a receiver since November 22, 1907, but has continued as usual since that time and it is ordered to go on by the court until March 4th, 1908.

The Loy-Nawrath Company, of 29 Runyon street, Newark, N. J., machinists and engineers, have completed the new two-story addition to their works. The installation of traveling crane, engine, shafting and heating apparatus will commence immediately. The firm manufacture power and foot presses, and sheet metal working machinery.

O. J. Moussette, of Driggs avenue and North 10th street, Brooklyn, N. Y., reports the sale of one of his No. 2 crushers to a firm in Genoa, Italy. The order came through the firm of J. W. & J. C. Phillips, of London, Eng. The purchase was made by the Genoa concern through their having heard of the excellent work these crushers have done.

The Joseph Dixon Crucible Company, of Jersey City, N. J., have bought the lot next to their present office upon which they have planned to build next summer. When the addition is completed it will double their office floor room. The company have been busy for several months putting up additional buildings for their various departments, including an extension to the crucible plant which is now finished.

The firm name of the Schreiber & Conchar Manufacturing Company, Dubuque, Iowa, has been changed to the Loetscher-Ryan Manufacturing Company, which concern will continue to manufacture the mechanical plating tanks, sad irons, registers and hardware specialties which were the output of the former firm. The new firm hopes to continue to receive the inquiries and orders from former customers.

F. H. Lovell & Co., of Arlington, N. J., who have been manufacturers of metal goods for many years, are now making a specialty of brass and white metal castings for all classes of work, including composition castings for the Government, bronze castings for mold makers, brass castings for everyday needs and white metal castings for the clock and novelty trade. They solicit correspondence and are in a position to fill orders promptly.

The Gilmer Company of Philadelphia, Pa., manufacturers of polishing belts and tape of all kinds, have established a New York office at 50 Broadway in charge of G. Walker Gilmer, Jr., Mr. Gilmer reports that their output of belts has been increasing steadily and that they would have even done a greater business if times had been better the last few months. Their polishing belts now go principally to the cutlery trade, from which there is a brisk demand.

"Anything That's Special" in small metal parts is the specialty of William A. Locke, metal goods manufacturer, 100 William street, New York. Mr. Locke, who has been a rolling mill agent for years, has recently taken up the manufacture of metal goods and with his various rolling mill and factory connections he is in a position to quote extremely low prices for all kinds of metal work. He issues an index card explaining his specialties, which card is cheerfully sent on application.

Our San Francisco, Cal., correspondent writes that the metal industry of California will soon be equivalent to the cotton industry of the South. The mountains and valleys of California furnish the raw material and the mountain streams supply the electric power for the manufacture of metal goods. The climate, especially San Francisco and vicinity, will always keep California's mechanics healthy, robust and in good cheer, ever alert to make improvements and compete with the best Eastern makes, reports our correspondent.

The new rolling mill of the Aluminum Company of America at Niagara Falls, N. Y., is nearly finished and will supply metal some time this winter. It will be used for sheet only. The temporary reduction plant which the company had acquired at Niagara to supply the demands for metal has been closed and will not be operated again, as the various new permanent plants

of the company are ready for operation and amply able to supply the demand for metal. The Aluminum Company now has fourteen sub-companies, besides branch offices in the largest cities.

The American Can Company contemplate putting up additional buildings at their New Castle plant, but the time to do this has not yet been determined. They are making every effort to get their present plant in operation at the earliest possible moment, but it is not known definitely when that will be. They are installing a complete system of fire sprinklers, this work being done by the General Fire Extinguisher Company, of Warren, O. They are also installing a steam heating plant which is being put in by the James M. Merritt Company, of New York City. As soon as ready the company will want a good many men, women and boys, and those having experience with their class of work will be given the preference.

The Garfield Smelting Company, an allied corporation to the American Smelting and Refining Company, has had in operation during the past year a million-dollar copper smelting plant at Garfield, Utah, situated on the south shore of the Great Salt Lake. This plant, covering 30 acres of ground, will eventually have a smelting capacity of 5,000 tons of ore per day. The storage bins from which the plant is supplied have a capacity of 25,000 tons of crude ore and concentrate. The concentrates and crushed ore are conveyed to the McDougall Roasting furnaces, of which there are 16 installed. These furnaces, built by Allis-Chalmers Company, Milwaukee, Wis., are each 18 ft. in diameter by 18 ft. 6 in. high, with a capacity which varies with the character of the material, its degrees of fineness, amount of moisture, and sulphur contents. Each furnace has about 1,200 sq. ft. of hearth area. The repairs on these furnaces are very small, the parts replaced being practically limited to the plows or rakes. For copper concentrates the average wear on the plows amounts to only  $\frac{1}{4}$  to  $\frac{1}{2}$  pound of cast iron per ton of material treated. The power required for operating a single McDougall furnace will average from  $2\frac{1}{2}$  to 4 horse-power.

## FIRE

A fire that caused about \$300,000 damages occurred in the rope mill of the extensive plant of John A. Roebling Sons Company, at Trenton, N. J., on the 5th.

During the morning of January 24 fire destroyed the brass foundry of J. Regester's Sons Company, of Baltimore, Md. The flames broke out in the third story of the six story building and soon the entire building was ablaze. The fire spread to adjoining property, damaging the plant of the Baltimore Bell & Brass Works. The Regester's Sons Company immediately made arrangements to get right back into business and before two weeks were running a foundry. They make plumbers' and steam fitters' brass work and castings of all kinds.

## FINANCIAL

The Waterbury Wire Die Company, of Waterbury, Conn., have filed a notice of an increase of capital stock from \$5,000 to \$25,000.

Amended articles of incorporation have been filed with the Secretary of State of Michigan increasing the capital stock of The American Bell & Foundry Company, of Northville, from \$16,000 to \$32,000.

Columbus Brass Company, of Columbus, O., have filed a certificate showing an increase of capital stock from \$200,000 to \$400,000. The officers of the company are Charles H. Linderberg, president, and G. W. Linderberg, secretary.

The capital stock of the Waterbury Manufacturing Company, of Waterbury, Conn., manufacturers of brass goods, has been increased from \$500,000 to \$1,000,000. This increase was made to have the capital somewhat more in accord with the present strength of the company.

The stockholders of the Nevada Consolidated Copper Company have approved the increase in the company's stock from \$6,500,000 to \$8,000,000, which means an addition to the capital of 300,000 shares of the par value of \$5 each. These shares will provide for the issue of \$3,000,000 ten-year convertible 6 per cent. bonds, which will be dated April 1, 1908, and secured by a first mortgage to the Bankers' Trust Company, acting as trustee.

The annual meeting of the stockholders of the Bristol Brass Company was held at the office of the company January 29. The old board of directors were elected and these officers were re-elected by the directors: President, Pierce N. Welch; vice-president and treasurer, Julian R. Holley; secretary and assistant treasurer, Samuel B. Harper. The annual meeting of the stockholders of the American Silver Company was held January 29. The old board of directors was elected and the officers are the same as the officers of the Bristol Brass Company.

The Utah Consolidated Mining Company, an Amalgamated Copper-Standard Oil enterprise, has completed arrangements for the smelting of its ores by the American Smelting & Refining Company. The transaction is regarded in financial circles as establishing closer relations between the Amalgamated and the American Smelting interests than have hitherto existed. The contract calls for the treatment of 300,000 tons of ore annually and has been made for one year with the option to extend it for another year. The Utah Consolidated state that within these two years it will be possible for the company to erect its own smelter, should such a course be found desirable.

The Newburyport Silver Company, of Keene, N. H., had a meeting of the board of directors, January 18, when it was decided to pay a semi-annual dividend of 3½ per cent. The balancing of the accounts showed that last year's business was the largest in the company's history, the increase being some 33 per cent. over the previous year, and this in spite of the general depression which marked the closing months of the past year. During the year just closed the company made important additions to the mechanical department, having put in a large and powerful rolling mill for silver work and a furnace for melting down the scrap. They also added a 600-pound hammer to the equipment and numerous small machines, tools and dies. The company are now making a line of articles such as smoking sets, loving cups, trays, and the like, of Tobin bronze.

## INCORPORATIONS

**MODEL BRASS FOUNDRY COMPANY**, of Cincinnati, O., has been incorporated with a capital of \$7,500 by E. M. Boland, A. P. Ryan, N. Boland, A. M. Boland and J. Lemkuhl.

**THE DAHLQUIST METAL SPINNING COMPANY**, of Boston, Mass., has been incorporated with a capital of \$1,000 by Arthur E. Teiner, president; Theodore W. Dahlquist, treasurer.

**THEBERATH & COMPANY**, of Newark, N. J., have been incorporated with a capital of \$25,000 to manufacture jewelry. The incorporators are J. Henry Theberath, Philip Rittersbacher and A. Lyndon Woodlawn.

**FALLS RIVET AND MACHINE COMPANY**, of Portland, Me., has been incorporated with a capital of \$200,000. The president is W. E. Dunham; treasurer, W. E. Dunham, Jr., and the clerk, C. O. Barrows, all of Portland.

**GORDON AUTOMOBILE SUPPLY COMPANY**, of Boston Mass., has been incorporated with a capital of \$10,000 to manufacture automobile supplies. The president and treasurer is Abraham Gordon and the clerk Joseph Cerel.

**WILLIAM DURST**, of Brooklyn, N. Y., has been incorporated to deal in brass goods, hardware supplies, etc., with a capital of \$40,000. The directors are William Durst, William F. Durst and George H. Durst, all of Brooklyn street.

**H. & M. ELECTRIC COMPANY**, of Boston, Mass., has been incorporated with a capital of \$25,000 to manufacture electrical appliances. President, Walter E. Brownell; treasurer, Florence B. Wonson, and clerk, Edith A. Wonson.

**THE TAYLOR INSTRUMENT COMPANY**, of Rochester, N. Y., has been incorporated with a capital of \$535,000 to manufacture scientific, mechanical and engineering instruments, by G. E., J. M. and Frank Taylor, all of Rochester.

**HAMPDEN MACHINE SCREW COMPANY**, of Springfield, Mass., has been incorporated with a capital of \$50,000 to manufacture screws. The president is John MacGregor; treasurer, Arthur L. Bowen, and clerk Stuart M. Robson, all of Springfield.

**THE AUTO-BI COMPANY**, of Buffalo, N. Y., has been incorporated with a capital of \$50,000 to manufacture horseless vehicles, motors, engines, etc. The incorporators are Clarence E. Becker, William C. Chadeayne, and John W. Van Allen, all of Buffalo.

**HUDSON MACHINE & REPAIR COMPANY**, of Jersey City, N. J., has been incorporated with a capital of \$100,000 to handle iron, steel, brass, copper and other metals. The incorporators are J. F. Reid, of Newark, N. J., J. D. Bedle and F. E. Williamson, of Jersey City.

**THE NEW JERSEY HORN & SHEET METAL COMPANY**, of Newark, N. J., has been incorporated with a capital of \$50,000 to manufacture sheet metal, tinware, etc. The incorporators are David Blilwise, Max Steiner, Michael Bremer, Asher Maurer and Burt S. Morris.

**DAVID D. SLAIGHT HARDWARE COMPANY**, of Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture builders' and miscellaneous hardware. The directors are: David D. Slaight, E. B. Irvin and Sylvester H. Williamson, all of Newark.

**THE SHEFFIELD MANUFACTURING COMPANY**, of Boston, Mass., has been incorporated with a capital of \$30,000 for the manufacture of silverware. The president is Charles H. Seavey, Jr., of Watertown; treasurer, Paul Wolfkehl, Newton, and clerk, Reuben S. Wyner, of Roxbury.

**BOCK & COMPANY** of New York City have been incorporated to manufacture steel and brass dies and stamps, the capital being \$5,000. The incorporators are Theodore Bock and Anna Bock, of Baldwin, N. Y.; Fred Henzerling and Josephine Henzerling, of 1616 Avenue A, New York City.

**THE CONNECTICUT CAN COMPANY**, of Hartford, Conn., has filed a certificate of incorporation for the manufacture of cans, boxes and vessels of tin or other material. The authorized capital stock is \$10,000. The incorporators are Havilah A. Blakeslee, Roger H. Blakeslee and Florence C. Blakeslee.

**AMERICAN SHEFFIELD SILVER COMPANY**, of New York City, has been incorporated with a capital of \$500,000 to manufacture and deal in silverware. The incorporators are Chester M. Freeman, Baltimore, Md., Charles E. Miller, Hotel Churchill, and James C. Gavigan, 1135 Broadway, New York City.

**THE NEW ENGLAND TROLLEY WHEEL COMPANY**, of Chicopee Falls, Mass., has been incorporated with a capital of \$50,000 to manufacture anti-friction trolley wheels. The officers of the company are L. J. Tetlow, president; Frank J. Shea, vice-president, and Dr. M. I. Shea, secretary and treasurer, all of Chicopee Falls.

**THOMAS BURKHARD, INC.**, of Brooklyn, N. Y., has been incorporated with a capital of \$10,000 to manufacture and deal in copper, brass, iron, etc. The incorporators are Thomas Burkhardt, Eleonora M. Burkhardt and William J. Burkhardt, all of 145 Monroe street, and Thomas Burkhardt, Jr., of 192 Monroe street.

**ALBERT COPPER COMPANY**, of New York City, has been incorporated with a capital of \$10,000 to manufacture electrolytic copper, sulphate of copper, etc. The address of the company is 25 Broad street. The incorporators are William H. Nichols, George M. Luther and Sanford H. Steele, all of the above address.

**THE CONNECTICUT HOOK & EYE COMPANY**, of Waterbury, Conn., has been incorporated with a capital of \$50,000 and has perfected organization with these officers: President, George E. Barber, of Derby; vice-president, Charles E. Clark, of Derby; secretary and treasurer, George A. Driggs, of Waterbury; assistant secretary, John P. Kellogg, of Waterbury.

**THOMAS GREGORY GALVANIZING WORKS**, of Valatie, N. Y., have been incorporated with a capital of \$30,000 to manufacture metal and structural work, galvanizing metal articles, etc. The incorporators are Thomas Gregory and William J. Gregory, 263 North Henry street, Brooklyn, N. Y., and Orville E. Allen and Harry L. Allen, of Hornell, N. Y.

**THE MONTAGUE CITY ALUMINUM, CARBON & BRICK COMPANY**, of Springfield, Mass., has been organized with a capital of \$150,000 to produce aluminum from the clay beds at Montague City, make brick and carbons for electrical purposes. The officers are: President, C. P. Wise; vice-president, W. C. Davis, Readsboro, Vt.; secretary and treasurer, W. H. P. Gilmore.

**THE DELAMOTHE NATURAL ART DECORATING COMPANY** has been incorporated at Spokane, Wash., capital \$25,000. The company is formed by L. G. Delamothe, the art plater who makes a specialty of metalizing flowers and other substances and who recently went to Spokane to establish a shop of his own. The offices of the company are at 609 Sprague avenue, Spokane, Wash., and shortly they will build a factory large enough to turn out 250 to 300 dozen pieces each week. Illustrations and descriptions of these metalized flower pieces have been published in **THE METAL INDUSTRY**. The officers of the new company are: L. G. Delamothe, president and general superintendent; A. Starke Oliver, treasurer; A. M. Dewey, vice-president; E. J. Hyde, manager, and Jos. A. Borden, secretary.

## PRINTED MATTER

**BEARING METAL.** The Dodge Manufacturing Company, of Mishawaka, Ind., has prepared a circular dealing with their Dodge bearing metal for shaft bearings, street car boxes and motors.

**SUIT CASE LOCKS.** We have received from the Corbin Cabinet Lock Company, of New Britain, Conn., their latest catalogue and price list of their dress suit cases, sample cases, hat box and buckle locks and trimmings.

**TANKS.** A circular from the Dow Chemical Manufacturing Company, of Mansfield, O., mentions their riveted steel tanks which they make in all sizes, all weights and of any shape, in wood, iron, stone, glass and earthenware.

**SEASONABLE CARDS.** The S. Obermayer Company, of Cincinnati, O., are sending to the trade a neat New Year greeting. The view is expressed that the present financial flurry is about over and that we can safely look forward to a brighter career during 1908.

**BRASS CANDLESTICKS.** A very neat pamphlet has been received from the W. D. Allen Manufacturing Company, of Chicago, Ill., dealing with their large line of brass candlesticks, which are made in solid cast brass and will last indefinitely. The designs are very graceful and attractive.

**THE WALLACE**, as the R. Wallace & Sons Manufacturing Company, silversmiths, of Wallingford, Conn., term it, is "A little magazine with a silver lining." The three issues before us contain many engravings of some of the latest patterns in sterling and silver plated ware produced by this firm, all of which are noteworthy for their beauty and delicacy of design.

**STEAM TURBINES.** We have received from the Kerr Turbine Company, of Wellsville, N. Y., a pamphlet fully describing the construction and mentioning the advantages of the Kerr steam turbine, which utilizes the principle of the Pelton water wheel, the buckets being of the double cup variety, but the form being changed to suit them to the use of steam as the motive fluid.

**LACQUERS.** The New Era Lustre Company, of New Haven, Conn., have issued a pamphlet mentioning the many good points of their lacquers. The company make a wide variety of lacquers of the best grades. Their equipment is modern and complete, with ample storage capacity and mixers, automatic measuring pumps, filters, etc., with which to insure uniformity at all times.

**HELVE HAMMERS.** as manufactured by the Parker Hoist & Machine Company, of Chicago, Ill., are fully explained in an attractive pamphlet just received. These hammers are stated to be modern and up to date, constructed of the best materials obtainable, and are built in a thoroughly workmanlike manner to give the best service. These hammers are made in several different types adapted to the widest range of work.

**TIN PLATE.** The Arrow, which is now in its sixth year, is issued by the N. & G. Taylor Company, of Philadelphia, Pa. This little publication is not a catalogue, but is a short chat about good roofing—tin roofing, and the company's leading brand of tin. It is intended to be—and is—an interesting reminder of the fact that the company are still offering the same durable tin plate that they have been selling for the past 50 years.

**FOUNDRY COMPOUNDS.**—An instructive and descriptive catalog has been issued by the Doggett Manufacturing Company, 101 Beekman street, New York City, on their foundry products, particularly "Fill-It," which is a compound for repairing and filling imperfect iron castings. The compound is made in a number of grades to fit each case. Besides "Fill-It" the Doggett Manufacturing Company are manufacturers of the "Perfection Parting Compound."

**SWITCHBOARD INSTRUMENTS.** Circulars have been received from the Weston Electrical Instrument Company, of Newark, N. J., describing their alternating current A. C. switchboard voltmeters and ammeters and their Eclipse switchboard voltmeters and ammeters for direct current. The latter are of the "soft iron" or "electro-magnetic type," but in their electrical and mechanical characteristics they are so far in advance of all preceding forms of soft iron instruments as to mark a new epoch in that type of instrument.

**THE UNIVERSAL STOKER.** We have received a pamphlet from the Oscar Barnett Foundry Company, of Hamilton, McWhorter and Bruen streets, Newark, N. J., treating of their latest traveling chain grate. This is claimed to be absolutely smokeless under all conditions, to be automatic in every respect and to be adapted to burn the most coke coal. Its use is guaranteed to affect a saving of at least from 10 to 15 per cent. and at the same time to greatly increase the capacity of the boiler. It may be adapted to all type of boilers and furnaces.

**COPPER WORK TOOLS AND MATERIALS.**—We find in an attractive catalogue issued by the Belcher & Loomis Hardware Company, of Providence, R. I., descriptions and illustrations of copper working tools and materials for all kinds of flat and raised work and enamelling. These tools are especially valuable in public and private schools where the working of sheet copper and brass has been introduced. Among the tools mentioned are anvils, hammers, files, snips and shears, pliers, blowpipes, tapping dies and tools, engraving tools, drills and drill presses, muffle furnaces, etc. The tools are sold in sets or singly.

**ALUNDUM.**—Two pamphlets have been received from the Norton Company, of Worcester, Mass. One gives a history of alundum which is now used by the company in the manufacture of their grinding appliances. This material is made in the electric furnace at Niagara Falls, where the company have a large plant for its making. While this abrasive resembles the purest natural corundum in chemical composition, it has the remarkable quality of being considerably harder than the natural

product. The second pamphlet deals with the automobile stone known as the India Oilstone, No. 53. This is intended especially for keeping the contact points of vibrator coils, which are made of platinum, bright. It is also very useful for grinding or smoothing rough surfaces and for sharpening small tools.

**ELECTRO PLATING OUTFITS AND SUPPLIES.** A large and thoroughly complete catalogue has been received from the Hanson & Van Winkle Company, of Newark, N. J., covering their chemicals, polishing lathes, polishers' and buffers' supplies, grinding machinery, dynamos and lacquers. The catalogue describes their new dynamo which possesses advanced features of merit not as yet generally applied, except in this instance. This dynamo insures the rapid deposition of metal. These machines are the result of the long experience of the company, as they were the first in this country to introduce dynamo-electric machines for use in plating. Mention is also made of the complete line of new polishing and buffing lathes and grinding machinery, and of the new ideas introduced by the company in polishing wheels. Their full line of lacquers are used by the largest manufacturers of metal goods.

### CATALOGUE BUREAU

THE METAL INDUSTRY has established a Catalogue Bureau by which it will prepare and do all the work necessary for the making of catalogues, pamphlets, circulars and other printed matter. Estimates will be furnished for writing the description, making engravings, printing, binding, in fact for the entire job from the beginning to the end or any part of it. Let us know your needs and we will tell you just exactly what we can do and what it will cost you. A catalogue should be a trade getter—that is the kind we produce. Write to the CATALOGUE BUREAU of THE METAL INDUSTRY, 61 Beekman street, New York.

### METAL MARKET REVIEW

New York, February 14, 1908.

**COPPER.**—The London copper market has ruled fairly steady and prices have fluctuated about £3 per ton. Spot G. M. B. opened at £61 2s. 6d. Trading has not been very active, operators abroad apparently waiting on better American trade developments.

In the home market the month of January has been very disappointing and the buying demand that seemed in a fair way to develop has fallen very flat. The only feature of interest in the market has been the enormous exports for the month, which, exclusive of Southern and Pacific ports, were 32,944 tons. When full returns are in we shall have exported close to 34,000 tons, against 17,039 tons in January, 1907. The price movement during the month has been very slow, Lake selling around 14 cents, and at the close of the market can be called dull, Lake 13.50, Electrolytic 13.25, Casting 13.00.

**TIN.**—The London tin market has tried to live up to its speculative record, but it has been hard work, as London had to do its own boosting independently of America and American demand. Spot Tin opened at £121, declined to £118 10s, advanced to £125 15s, and closed at £124 5s, showing a net advance for the month of about £3 per ton.

The New York market has been dull and featureless. The consumption for the month is estimated at 1,500 tons. The total consumption of Europe and America is estimated at 3,991 tons, while the shipments from the Straits were 5,218 tons, so that the total visible supply at the end of the month showed an increase of nearly 3,000 tons over the figures at the end of 1907. The price of tin in New York has advanced very nearly one cent per pound. Opening at 27 cents, price at the end of January was 27.85. The market closes to-day around 30 cents, and for futures price is 25 to 75 points less.

The stocks of tin in America are very small and we may see a squeeze in spot tin before the month is out.

**LEAD.**—The foreign lead market has ranged between £14 10s. and £15 during the month.

In the New York market lead has been dull and more or less neglected. During the first half of January prices were pushed up slightly, but the demand did not warrant any advance and the market at the close is dull and unsettled at 3.75, New York carload lots, and around 3.65 at East St. Louis.

**SPELTER.**—The foreign spelter market shows a net advance for the month of about £1 per ton. Mail advices show that efforts have been made to lift the price abroad and unload American spelter in that market, the movement was not successful and no business was put through.

The New York market is firmer and prices during the month have advanced about  $\frac{1}{2}$  cent per pound. St. Louis today is quoted at 4.75, against 4.25 a month ago. The demand is not very active and the tendency of the market is uncertain.

**ANTIMONY.**—The foreign market has advanced about £3 per ton and prices in New York are possibly  $\frac{1}{4}$  cent higher than a month ago. The metal market has not yet woken up and antimony is waiting on the other metals.

**ALUMINUM.**—The demand for this metal continues very dull and prices are unchanged from 33 to 35 cents per pound. Sheet, plates, bars and tubing are unchanged.

**SILVER.**—The silver market has been rather more active and prices have advanced about 2d per ounce in London and 4 cents per ounce here, closing at around 26d. in London, official price, and 57 cents here.

**SHEET METALS.**—There has been no change in the base price of sheet copper or brass, tubing or wire. The wire drawers report business very dull and unsatisfactory, but the sheet copper users are in better shape and look for a steady increase in orders, and the outlook generally is improved.

**OLD METALS.**—The old metal business has been dull and disappointing. Continued declines in copper abroad have stopped all trading, and prices of old metals are inclined to sag. There has been a little export business reported, but the outlook at the moment is not very bright.

### THE JANUARY MOVEMENTS IN METALS

	Highest	Lowest	Average
COPPER—			
Lake .....	14.00	13.75	13.87
Electrolytic .....	13.75	13.50	13.65
Casting .....	13.50	13.25	13.37
TIN .....	27.75	26.25	27.00
LEAD .....	3.75	3.50	3.65
SPELTER .....	4.50	4.20	4.40
ANTIMONY (Hallets) .....	9.00	8.50	8.80

### DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Reports of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of \$10. The price of the Report alone is \$10. Sample copies furnished for the asking. We can also furnish daily telegraphic reports of metal prices.

### ANALYZING AND TESTING BUREAU

THE METAL INDUSTRY is independent of all laboratories, but we offer our services in directing our readers where they can get metals, materials and supplies analyzed and tested to the best advantage. We have an intimate knowledge of the best laboratories in the country and know the specialties of the different ones. Cost for analysis or test furnished on receipt of sample.

## Metal Prices, February 17, 1908

### NEW METALS.

	Price per lb.
<b>COPPER, PIG, BAR AND INGOT AND OLD COPPER.</b>	
Duty Free.	Manufactured 2½c. per lb.
Lake, car load lots.	13.50
Electrolytic, car load lots.	13.25
Casting, car load lots.	13.00
<b>TIN—Duty Free.</b>	
Straits of Malacca, car load lots.	29.90
<b>LEAD—Duty Pigs, Bars and Old 2½c. per lb., pipe and sheets 2½c. per lb.</b>	
Pig lead, car load lots.	3.70
<b>SPELTER—Duty 1½c. per lb.</b>	
Western, car load lots.	4.75
<b>ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods 13c. per lb.</b>	
Small lots.	35.00
100 lb. lots.	34.00
Ton lots.	33.00
<b>ANTIMONY—Duty ¾c. per lb.</b>	
Cookson's, cask lots, nominal.	9.25
Halletts, cask lots.	9.00
Other, cask lots.	8.50
<b>NICKEL—Duty 6c. per lb.</b>	
Shot, Plaquettes, Ingots, Blocks, according to quantity	45 to .60
<b>MANGANESE—Duty 20%</b>	
MAGNESIUM—Duty Free	\$1.40
BISMUTH—Duty Free	1.80
CADMUM—Duty Free	1.55 to 1.60
<b>PRICE PER OZ.</b>	
GOLD—Duty Free	\$20.67
SILVER—Duty Free	.57
PLATINUM—Duty Free	27.00
QUICKSILVER—Duty 7c. per lb. Price per pound	.63c. to 64c.

### OLD METALS.

	Price per lb.
Heavy Cut Copper	11.25
Copper Wire	11.00
Light Copper	9.75
Heavy Mach. Comp.	10.50
Heavy Brass	8.00
Light Brass	6.00
No. 1 Yellow Brass Turnings	7.00
No. 1 Comp. Turnings	9.00
Heavy Lead	3.00
Zinc Scrap	3.00
Scrap Aluminum, turnings	7.00
Scrap Aluminum, cast, alloyed	18.00
Scrap Alumint.m, turnings	7.00
Old Nickel, solid	22.00
No. 1 Pewter	18.00

### INGOT METALS.

	Price per lb.
Silicon Copper	according to quantity
Phosphor Copper, 5%	33 to 38
Phosphor Copper, 10% to 15%	19 to 21
Guaranteed	28 to 30
Phosphor Tin	34 to 36
Brass Ingot, Yellow	10 to 12
Brass Ingot, Red	12 to 14
Bronze Ingot	12 to 14
Manganese Bronze	17 to 19
Phosphor Bronze	16 to 19
Casting Aluminum Alloys	29 to 35

### PHOSPHORUS—Duty 18c. per lb.

According to quantity

32 to 42

### PRICES OF HOT ROLLED SHEET COPPER.

SIZES OF SHEETS.	CENTS PER POUND.
64 oz. and over 50 lb. sheet	20
30 x 60 and heavier	20
32 oz. to 64 oz. 25 to 50 lbs.	20
sheet 30 x 60.	20
20 oz. to 32 oz. 18% to 23 lbs.	20
sheet 30 x 60.	20
16 oz. to 24 oz. 12½ to 18% lbs.	20
sheet 30 x 60.	20
14 oz. and 15 oz. 11 to 12½ lbs.	20
sheet 30 x 60.	20
12 oz. and 13 oz. 9½ to 11 lbs.	20
sheet 30 x 60.	20
10 oz. and 11 oz. 7½ to 9½ lbs.	20
sheet 30 x 60.	20
8 oz. and 9 oz. 6½ to 7½ lbs.	20
sheet 30 x 60.	20
Lighter than 8 oz.	20

WIDER THAN 30 IN.	NOT LONGER THAN 72 INCHES.	20	20	20	21	22	23	26	29
WIDER THAN 30 IN., BUT NOT WIDER THAN 48 IN.	LONGER THAN 72 INCHES. NOT LONGER THAN 96 INCHES.	20	20	20	21	23	26	29	29
WIDER THAN 48 IN., BUT NOT WIDER THAN 60 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	20	20	20	20	22	26	29	30
WIDER THAN 60 IN.	NOT LONGER THAN 72 INCHES.	20	20	20	20	22	24	27	27
WIDER THAN 60 IN., BUT NOT WIDER THAN 72 IN.	LONGER THAN 72 INCHES. NOT LONGER THAN 96 INCHES.	20	20	21	23	25	28	28	28
WIDER THAN 72 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	20	20	22	24	28	28	28	28
WIDER THAN 120 IN.	LONGER THAN 120 INCHES.	20	21	23	26	26	26	26	26
WIDER THAN 120 IN., BUT NOT WIDER THAN 132 IN.	NOT LONGER THAN 72 INCHES.	20	20	21	23	26	30	30	30
WIDER THAN 132 IN.	LONGER THAN 72 INCHES. NOT LONGER THAN 96 INCHES.	20	20	22	24	29	29	29	29
WIDER THAN 132 IN., BUT NOT WIDER THAN 144 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	20	21	23	26	26	26	26	26
WIDER THAN 144 IN.	LONGER THAN 120 INCHES.	21	21	22	24	28	28	28	28
WIDER THAN 144 IN., BUT NOT WIDER THAN 168 IN.	NOT LONGER THAN 96 INCHES.	20	20	22	24	29	29	29	29
WIDER THAN 168 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	20	21	23	26	26	26	26	26
WIDER THAN 168 IN., BUT NOT WIDER THAN 180 IN.	LONGER THAN 120 INCHES.	21	21	23	26	26	26	26	26
WIDER THAN 180 IN.	NOT LONGER THAN 96 INCHES.	20	21	23	26	26	26	26	26
WIDER THAN 180 IN., BUT NOT WIDER THAN 192 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	20	22	25	30	30	30	30	30
WIDER THAN 192 IN.	LONGER THAN 120 INCHES.	21	23	28	28	28	28	28	28
WIDER THAN 192 IN., BUT NOT WIDER THAN 204 IN.	NOT LONGER THAN 96 INCHES.	21	23	26	26	26	26	26	26
WIDER THAN 204 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	22	24	27	27	27	27	27	27
WIDER THAN 204 IN., BUT NOT WIDER THAN 216 IN.	LONGER THAN 120 INCHES.	23	25	29	29	29	29	29	29
WIDER THAN 216 IN.	NOT LONGER THAN 96 INCHES.	24	26	26	26	26	26	26	26
WIDER THAN 216 IN., BUT NOT WIDER THAN 228 IN.	LONGER THAN 96 INCHES. NOT LONGER THAN 120 INCHES.	25	28	28	28	28	28	28	28
WIDER THAN 228 IN.	LONGER THAN 120 INCHES.	25	28	28	28	28	28	28	28

Rolled Round Copper,  $\frac{1}{2}$  inch diameter or over, 20 cents per pound. (Cold Drawn, Square and Special Shapes, extra.)  
 Circles, Segments and Pattern Sheets three (3) cents per pound advance over prices of Sheet Copper required to cut them from.  
 All Cold or Hard Rolled Copper, 14 ounces per square foot and heavier, one (1) cent per pound over the foregoing prices.

All Cold or Hard Rolled Copper, lighter than 14 ounces per square foot, two (2) cents per pound over the foregoing prices.

Cold Rolled and Annealed Copper, Sheets and Circles, take the same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

All Polished Copper, 20 inches wide and under, one (1) cent per pound advance over the price for Cold Rolled Copper.

All Polished Copper, over 20 inches wide, two (2) cents per pound advance over the price for Cold Rolled Copper.

Planned Copper, one (1) cent per pound more than Polished Copper.

Cold Rolled Copper prepared suitable for polishing, same prices and extras as Polished Copper.

Tinning Sheets, on one side,  $3\frac{1}{2}$  c. per square foot.

For tinning both sides, double the above price.

For tinning the edge of sheets, one or both sides, price shall be the same as for tinning all of one side of the specified sheet.

### COPPER BOTTOMS, PITS AND FLATS.

14 oz. to square foot and heavier, per lb.	24c.
12 oz. and up to 14 oz. to square foot, per lb.	25c.
10 oz. and up to 12 oz.	27c.
Lighter than 10 oz.	30c.
Circles less than 8 in. dia., 2c. per lb. additional.	
Circles over 13 in. dia. are classed as Copper Bottoms.	
Polished Copper Bottoms and Flats, 1c. per lb. extra.	

Zinc—Duty, sheet, 2c. per lb.	Price per lb.
600 lb. casks	7.50
Open casks	8.00

## Metal Prices, February 17, 1908

### PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect January 2nd, 1908, and until further notice.

To customers who purchase less than 5,000 lbs. per month and over 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	\$0.14 1/2	\$0.16 1/2	\$0.18 1/2
Wire 1/4" and larger	.14 1/2	.16	.18
Wire smaller than 1/4" to No. 8, inclusive	.15 1/2	.17	.19
Wire smaller than No. 8 to No. 10, inc'sive	.15 1/2	.17	.19
Rods 1/4" and larger to 1/2" diameter	.14 1/2	.16	.19
Rods 1/4" to 1" diameter, both inclusive	.14 1/2	.16	.19
Brazed tubing	.20 1/2		.23
Open seam tubing	.18 1/2		.21
Angle and channel	.20 1/2		.24

30% discount from all extras except for quality.

#### NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	1 1/4 c.	per lb. net advance.
" Best spring, drawing and spinning brass...	2 1/4 c.	" "
" Rich low brass...	1 1/4 c.	" "
Wire—Extra spring and brassing brass wire...	1 1/4 c.	" "
" Best spring and brassing brass wire...	2 1/4 c.	" "
" Rich low brass wire...	1 1/4 c.	" "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb.		
	High Brass.	Low Brass.	Bronze.
Sheet	\$0.15 1/2	\$0.17 1/2	\$0.19 1/2
Wire 1/4" and larger	.15 1/2	.17	.19
Wire smaller than 1/4" to No. 8, inclusive	.16 1/2	.18	.20
Wire smaller than No. 8 to No. 10, inc'sive	.16 1/2	.18	.20
Rods 1/4" and larger to 1/2" diameter	.15 1/2	.17	.20
Rods 1/4" to 1" diameter, both inclusive	.15 1/2	.17	.20
Brazed tubing	.21		.24
Open seam tubing	.19		.22
Angle and channel	.21		.25

5% discount from all extras except for quality.

#### NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	2 1/4 c. per lb. net advance.
" Best spring, drawing and spinning brass...	3 1/4 c. "
" Rich low brass...	1 1/4 c. "
Wire—Extra spring and brassing brass wire...	2 1/4 c. "
" Best spring and brassing brass wire...	3 1/4 c. "
" Rich low brass wire...	1 1/4 c. "

### PRICES FOR SEAMLESS BRASS TUBING.

From 1 1/4" to 3 1/2" in. O. D. Nos. 4 to 13 Stubs' Gauge, 20c. per lb.  
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

### PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size. 1/4" 1/2" 3/4" 1" 1 1/4" 1 1/2" 2" 2 1/2" 3" 3 1/4" 4" 4 1/4" 5" 6"	Price per lb. 28 27 22 21 20 20 20 20 20 21 22 24 26 27

### PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet	Brass. Bronze.
1/4" inch.	\$8	\$9
5/16" inch.	8	9
3/8" inch.	10	11
7/16" inch.	12	13
1/2" inch.	14	15
5/8" inch.	18	20
1 1/8" inch.	22	24
1 1/4" inch.	25	27
1 1/2" inch.	32	35
1 3/8" inch.	45	48
2" inch.	56	60

Discount 45 per cent.

### PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	15c. lb. net base
Rectangular Sheets other than Sheathing	
" " " Rod	17c. " " "
" " " Above are for 100 lbs. or more in one order.	16c. " " "

### PLATERS' METALS.

Platers' bars in the rough, 23 1/4 c. net.	
German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.	
Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.	

### PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 22 B. S. Gauge, 4c. above price of pig tin in same quality.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

### PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than.....	
	and including.....	
No. 13 and heavier.....	40	40 42 42 42 42 42 45 45 45
14.....	40	40 42 42 42 42 42 45 45 45
15.....	40	40 42 42 42 42 42 45 45 45
16.....	40	40 42 42 42 42 42 45 45 45
17.....	40	40 42 42 42 42 42 45 45 45
18.....	40	40 42 42 42 42 42 45 45 48
19.....	40	40 42 42 42 42 42 45 46 49
20.....	40	42 42 42 42 42 44 47 48 50
21.....	40	44 44 44 44 44 46 49 50 56
22.....	40	44 44 44 44 46 46 49 53 57
23.....	40	44 44 44 44 46 46 49 55 58
24.....	40	44 46 48 48 48 51 57 60
25.....	42	45 47 49 49 52 52 59 63
26.....	42	45 48 52 52 57 61 67
27.....	42	46 50 54 54 55 60 64 70
28.....	42	46 52 54 55 55 62 68 73
29.....	44	47 54 56 58 58 67 73 78
30.....	44	48 56 58 62 68 76 78 83
31.....	49	53 61 64 66 77 80 83 88
32.....	51	55 63 67 75 83 90 96 101
33.....	53	57 66 71 79 90 97 106 116
34.....	56	61 68 76 84 97 109 121 131
35.....	71	76 86 106 121 126 141
36.....	86	96 106 121 126 141
37.....	110	114 135 150 165 180
38.....	130	145 160 175 190 210
39.....	150	170 190 210 230
40.....	180	210 230 250

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are for 50 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

### PRICE LIST OF SEAMLESS ALUMINUM TUBING.

Stubs' G. B. & S. G. 1 1/4" 1 1/2" 1 3/4" 2" 2 1/4" 2 1/2" 2 3/4" 3" 3 1/4" 3 1/2" 3 3/4" 4" 4 1/4" 4 1/2"

4 to 11	3 to 9	BASE PRICE 50 CENTS.	3	3	3	10
12	10		6	6	6	13
13	11		10	10	10	16
14	12	3 3 3 3 3 3 3	3	3	3	13 13 19
15	13	3 3 3 3 3 3 3	3	3	3	19 19 22
16	14	6 6 6 6 6 6 6	6	6	6	19 22 25 35
17	15	10 10 10 10 10 10 10	10	10	10	16 19 22 25 29 38
18	16	13 13 13 13 13 13 13	13	13	13	19 22 25 29 32 35 41 48 54
19	17	16 16 16 16 16 16 16	22	22	22	25 29 32 35 41 46 60
20	18-19	19 19 19 19 19 19 19	22	22	22	25 29 35 41 46 60
21	22	22 22 22 22 22 22	22	22	22	
22	21	25 25 25 25 25 25	25	25	25	
23	22	35 35 35 35 41 48	35	35	35	
24	23	57 60 60 60 63 67	57	60	63	
25	24	73 76	73	76		

Prices are for ten pounds or more at a time. For prices on smaller sizes send for manufacturers' list.

### PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb....	38	38 1/2	38 1/2	38	39 1/2	40	40 1/2	41	42	43	44	45	52

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

### PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12.....	\$0.52	16.....	\$0.58
13.....	.53	17.....	.59
14.....	.54	18.....	.60
15.....	.55		

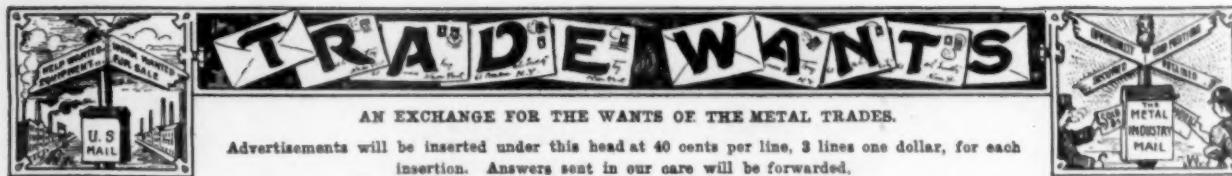
These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 45 per cent.

### GERMAN SILVER TUBING.

4 per cent. to No. 19.	B. & S. Gauge, inclusive.	\$0.60
19.....	19.....	.70
19.....	19.....	.85
19.....	19.....	1.00
19.....	19.....	1.15
19.....	19.....	1.20
19.....	19.....	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Braised Brass Tube.

For cutting to special lengths add same advances as for Braised Brass Tube. Discount 35 per cent

**METALS, MACHINERY AND SUPPLIES FOR SALE****We have for sale the following****Second hand PLATING DYNAMOS**

on account of same being too small for our work:

**One 6 volt Card Machine** rated at 1000 amperes, cost \$400.00, new 8 years ago **for sale at \$100.00**

**Two 6 volt Card Machines** rated at 700 amperes, cost \$350.00 each, new 8 years ago **for sale at \$80.00 each**

ALL F. O. B. PERU, ILL.

**American Nickeloid & Mfg. Co.  
PERU, ILL.**

**FOR SALE—POLISHING AND PLATING OUTFIT COMPLETE.** For particulars address DELAWARE PLATING COMPANY, 517 East Third street, Wilmington, Del.

**FOR SALE—BRASS FOUNDRY IN GOOD LOCATION.** Has a steady run of orders. Good chance for practical man. Address F-1, care THE METAL INDUSTRY.

**FOR SALE—AT A SACRIFICE, A BRICK FOUNDRY FACTORY** with all of the machinery for smelting. Located at Utica, N. Y. For further information inquire of SAMUEL ELLIS, 322 Canal street, New York City.

**FOR SALE—THE COLUMBIA HAND PROTECTOR.** A device which saves the fingers of pattern makers and avoids accidents. Further particulars furnished for the asking. Address F-2, care THE METAL INDUSTRY.

**FOR SALE CHEAP—A MOUSSETTE NO. 2 STEEL CRUSHER,** f. o. b. Newark, N. J.; in use four months. Address D. I. CANFIELD, 196 Newark street, Newark, N. J.

**FOR SALE—ONE 275 STEELE-HARVEY FURNACE** in perfect condition. Will sell cheap. For further particulars address Box 1, care THE METAL INDUSTRY.

**FOR SALE—Small quantity of Steel Knife Blanks and Metal Fork and Spoon Blanks.** Address, AYER MANUFACTURING COMPANY, Keokuk, Iowa.

**FOR SALE—A World Plating Dynamo about 6 volts, 300 amperes, in good working condition.** Has been run on 400 gallon brass solution, 200 gallon nickel and copper. Only fault too small for our increasing business. Address THE METAL MANUFACTURING CO., 106 Park street, New Haven, Conn.

**FOR SALE—5 to 10 tons prime remelted SPELTER; also 5,000 pounds TERNE METAL.** Quotations upon application. Address P. McLAUGHLIN'S SONS COMPANY, 230-236 North Twelfth street, Brooklyn, N. Y.

**FOR SALE—A lot of new SHEET BRASS and ALUMINUM** at a bargain. WALSH'S SONS & CO., Newark, N. J.

**METALS, MACHINERY AND SUPPLIES WANTED**

**WANTED—One Universal Milling Machine, second hand.** Must be in good order. Address GIBBS, 1097 S. Western avenue, Chicago.

**WANTED—A SMALL SECOND-HAND TANK** with brass anodes. Address F-3, care THE METAL INDUSTRY.

**WANTED—To manufacture by a well equipped plant, some foundry machine or device.** Can furnish capital, engineering experience and a first-class manufacturing plant. Address HAWLEY DOWN DRAFT FURNACE COMPANY, Chicago, Ill.

**WANTED—A smelting plant located on the Atlantic seaboard.** Address RELIANCE, care THE METAL INDUSTRY.

**WANTED—A SECOND HAND** small experimenting furnace to melt about 30 pounds of metal a day. Address EXPERIMENT, care THE METAL INDUSTRY.

**CASH PAID** for old precious metals and minerals in any form. Gas mantle dust, bronze powder, bismuth, platinum, mercury, nickel, etc. Address JOSEF RADNAL, 36 Fulton street, New York City.

**WANTED—METALS and WASTE** of all kinds. Address WALSH'S SONS & CO., Newark, N. J.

**SITUATIONS OPEN**

**WANTED—AN EXPERIENCED PLATER AND METAL COLORER.** familiar with producing oxidized and sand blast finishes on chandeliers and portables. State experience and salary expected. Address PLATER, F-4, care THE METAL INDUSTRY.

**WANTED—A BRASS MOLDER,** young single man who is willing to start for \$3.00 per day. For further particulars address M. C. C., care THE METAL INDUSTRY.

**WANTED—A MOLDER** who understands BRASS and ALUMINUM and alloys. Small new foundry, electric equipment, country town. Address C. C. M., care THE METAL INDUSTRY.

**SITUATIONS WANTED**

**SITUATION WANTED—BY BRASS FOUNDRY FOREMAN.** Has had experience with foundries of locomotive and indicator plants. Thoroughly capable and can furnish best references. Address F-5, care THE METAL INDUSTRY.

**SITUATION WANTED—BY FIRST CLASS PLATER AND POLISHER.** Has had 16 years' experience and had charge of men for the last 10 years. Can handle any kind of a plant, understands all finishes and can give good reference. Address F-6, care THE METAL INDUSTRY.

**SITUATION WANTED—By PLATER** thoroughly conversant with Bronze, Brass, Copper and Nickel Plating, their oxidizes and finishes. Can furnish best of references. Address Box No. 6, care THE METAL INDUSTRY.

**SITUATION WANTED—By BRASS FOUNDRY FOREMAN** who thoroughly understands the business. Desire to take charge and work for an interest in same. Address Box 120, Lincoln Park, N. Y.

**SITUATION WANTED—By PATTERN MAKER and MOLDER** in Fancy Bronze and Sterling Silverware in shop. Knows up-to-date methods resulting in extreme economy of labor. Can demonstrate and give good references. Address Box No. 7, care THE METAL INDUSTRY.

**SITUATION WANTED—By PLATER** with 28 years' experience in all metals, including platinum. Should be glad to hear from firms desiring the services of a first class plater. Address Box No. 8, care THE METAL INDUSTRY.

**SITUATION WANTED—By BRASS FOUNDRY FOREMAN** of 25 years' experience. Thoroughly familiar with new and old metals and well posted on moulding heavy and light castings; also the handling of men. Can furnish best of references. For further particulars address Box No. 9, care THE METAL INDUSTRY.

**SITUATION WANTED—By a COPPERSMITH,** having worked at this trade three years as apprentice and one year as master workman. High school education and familiar with all sorts of copper, brass and bronze work—casting, die work, spinning, brazing, finishing, etc. For further particulars address Box No. 10, care THE METAL INDUSTRY.

**SITUATION WANTED—By ELECTRO-PLATER** with up-to-date methods, resulting in extreme economy as to labor and superior finish. Would like to take position at once, can demonstrate and give satisfactory reference. Address ELECTRO-PLATER, care THE METAL INDUSTRY.

**SITUATION WANTED—By a FIRST-CLASS PLATER,** to take charge of PLATING PLANT. Can furnish satisfactory reference of ability to take charge. Address WM. McCONNELL, 1665 58th street, Brooklyn, N. Y.

**SITUATION WANTED—Position as Foundry Foreman or Superintendent in brass.** Have had twenty years' experience and can give the best of references. Do my own mixing. Address F. B. M., care THE METAL INDUSTRY.

**SITUATION WANTED—Position as DESIGNER** in Sterling Silver. Have had 15 years' experience with leading manufacturers. Understands also etching and modeling. Address DESIGNER, care THE METAL INDUSTRY.

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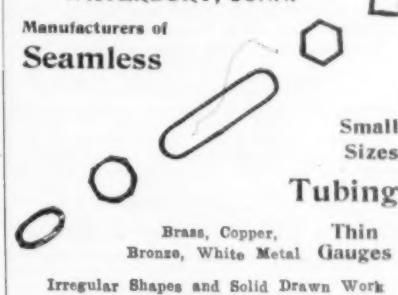
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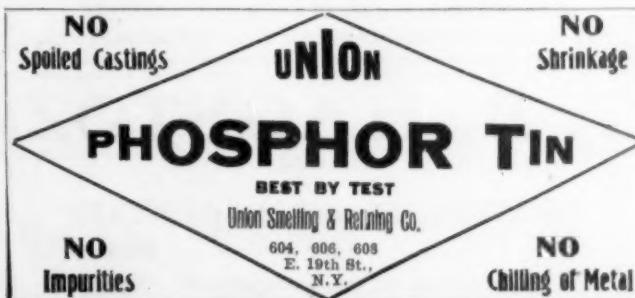
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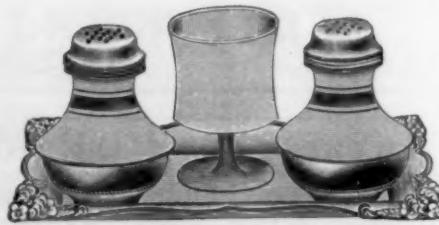


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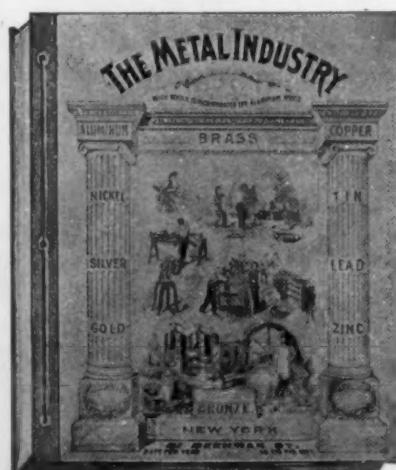
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Two Qualities  
10 or 15%  
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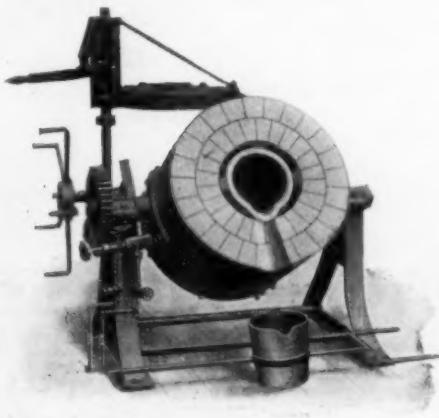
### THE "STEELE-HARVEY" CRUCIBLE TILTING FURNACE or "MONARCH" REMOVABLE CRUCIBLE FURNACE

#### CONDITIONS

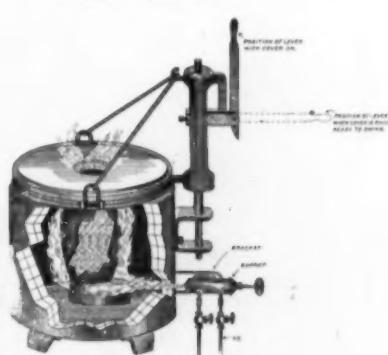
We operate with Fuel Oil, City or Natural Gas. Crucibles from Nos. 10 to 650. Capacity from 30 to 1,600 lbs. per heat. Guarantee superior quality of metal, increased life of crucibles, reduction in fuel cost, all enabling you to pay for furnace by economy effected during first year.



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Pouring Position.



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Catalogues? Sure!

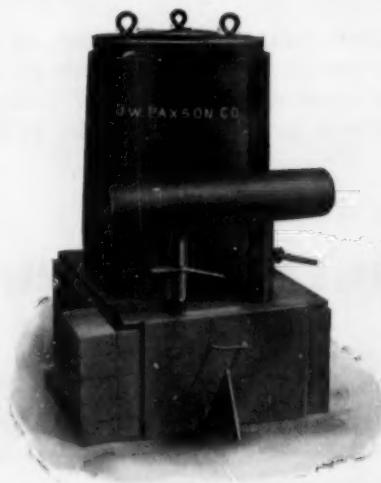


Fig. 621  
Forced Draft Furnace



Fig. 622  
Natural Draft Furnace  
"SQUARE"



Fig. 623  
Natural Draft Furnace  
"ROUND"

Also made with drop-grate,  
and with closed bottom to be  
used with forced draft

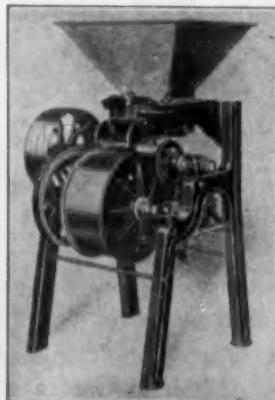


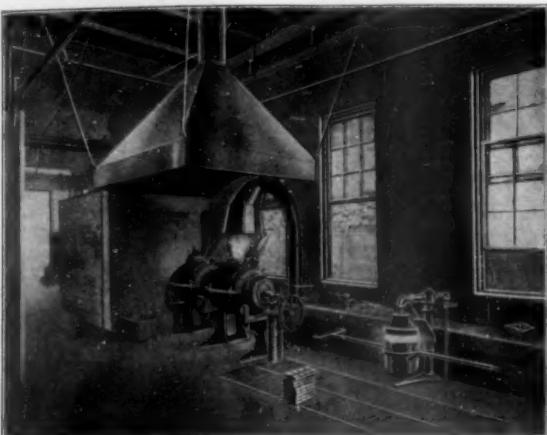
Fig. 76  
The Paxson-Sawyer  
Magnetic Separator

## MAGNETIC SEPARATORS

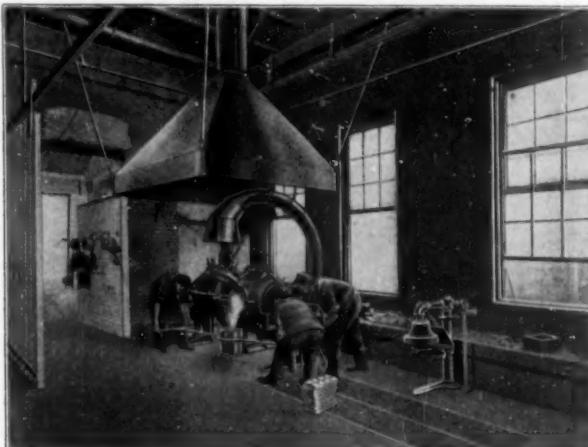
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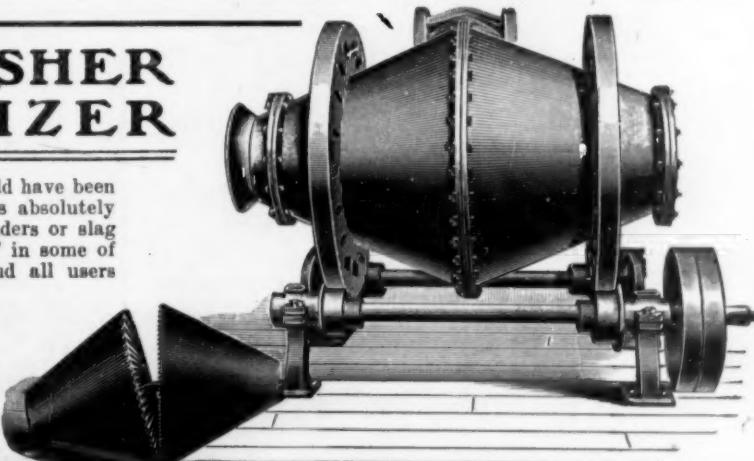
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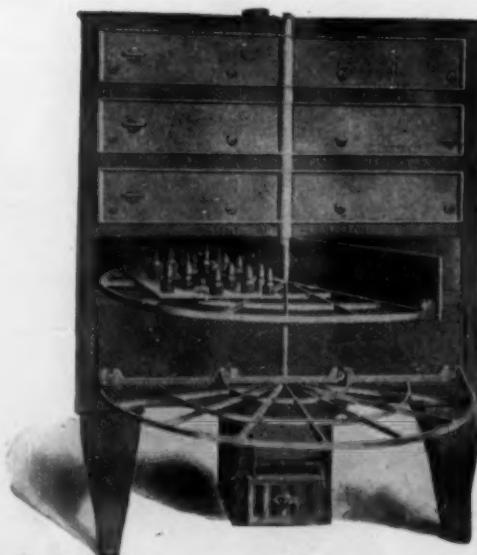
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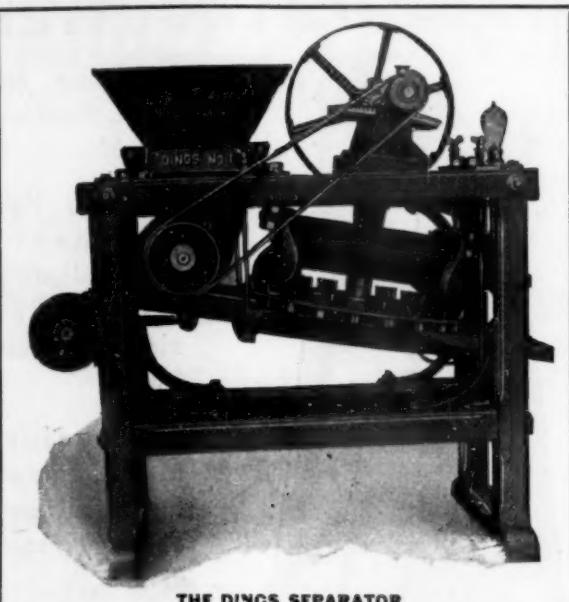
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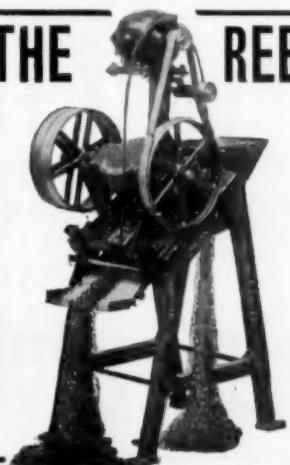
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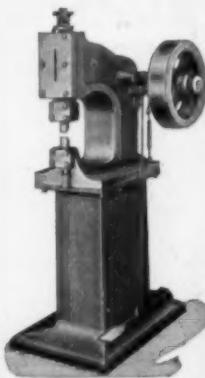
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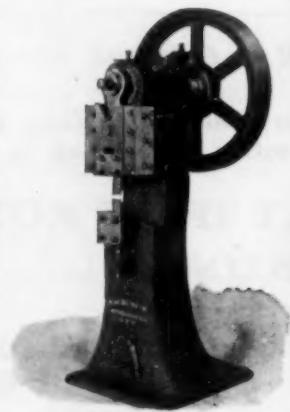
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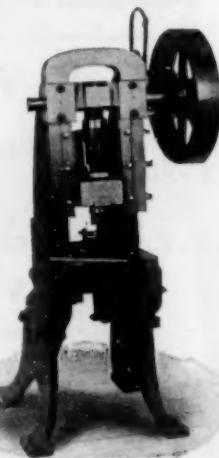
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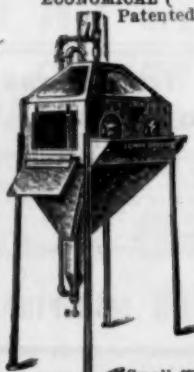
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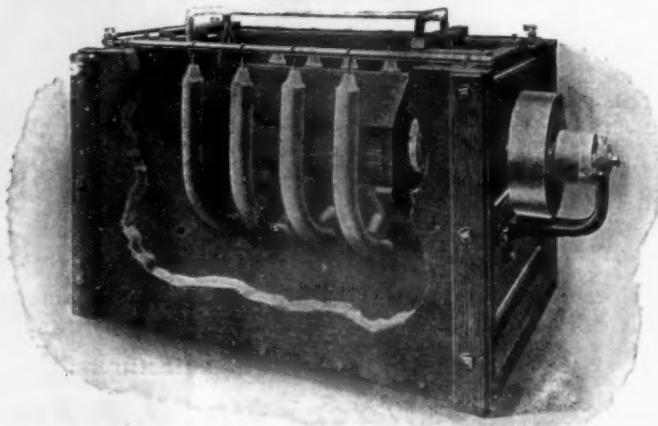
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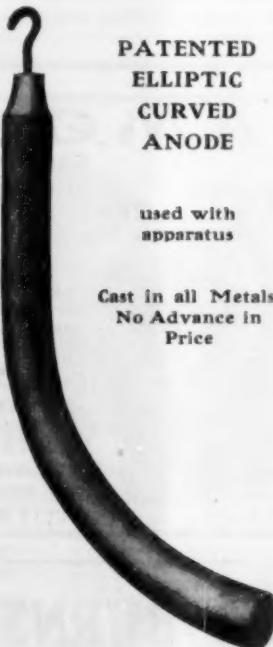
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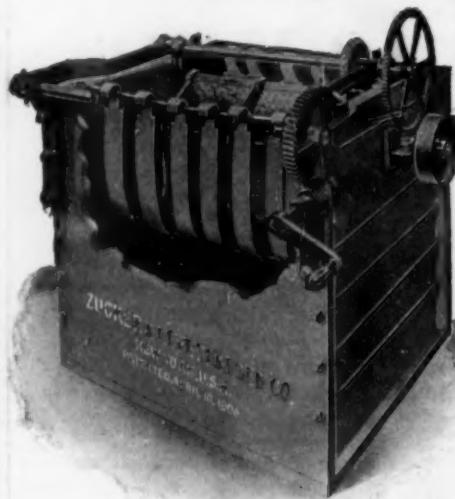
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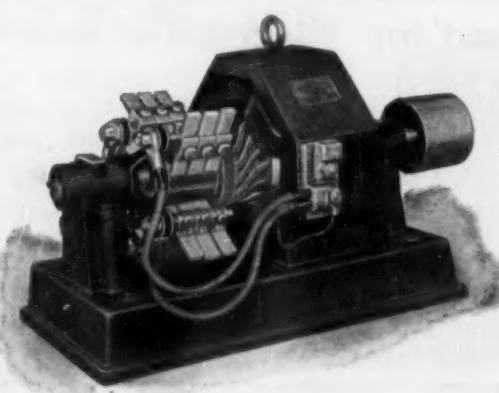
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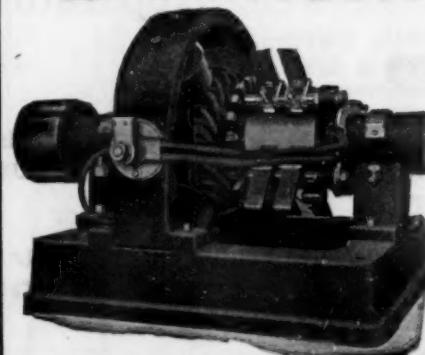
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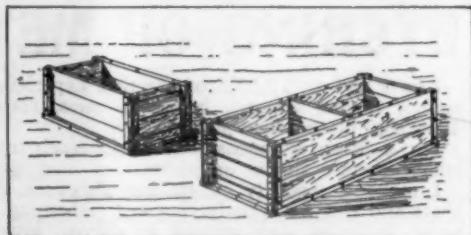


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**See Page 30**

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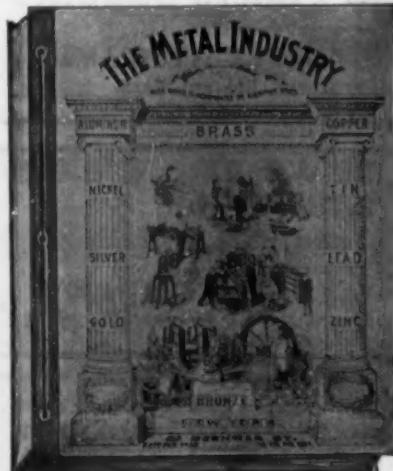
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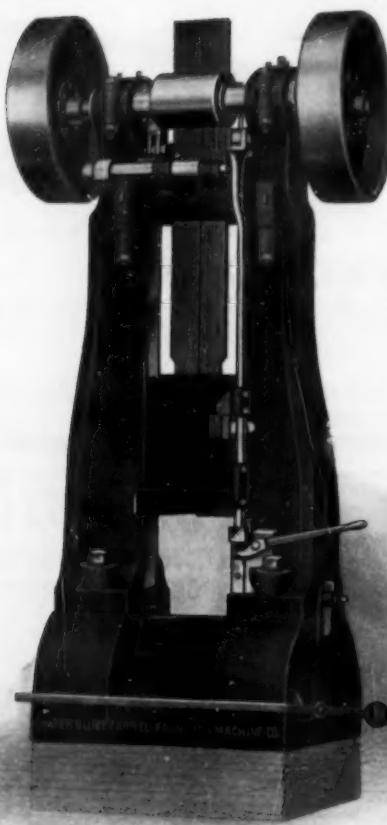
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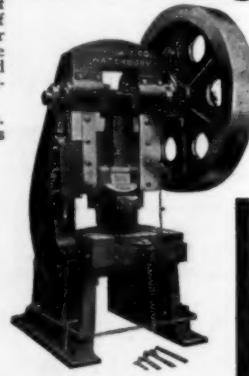
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